TECHNOLOGY DEPARTMENT

THE CHEMICAL AGE

VOL LVII 25 OCTOBER 1947 No 1476

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IN THIS ISSUE

To Cockroaches

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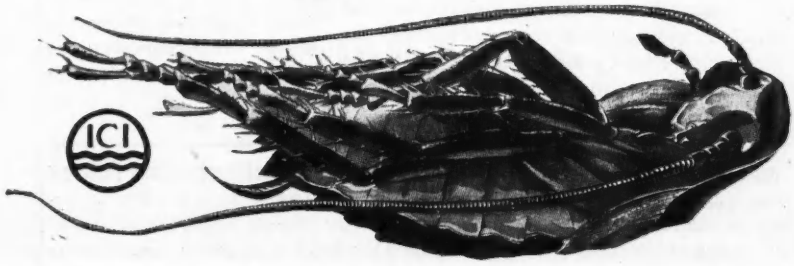

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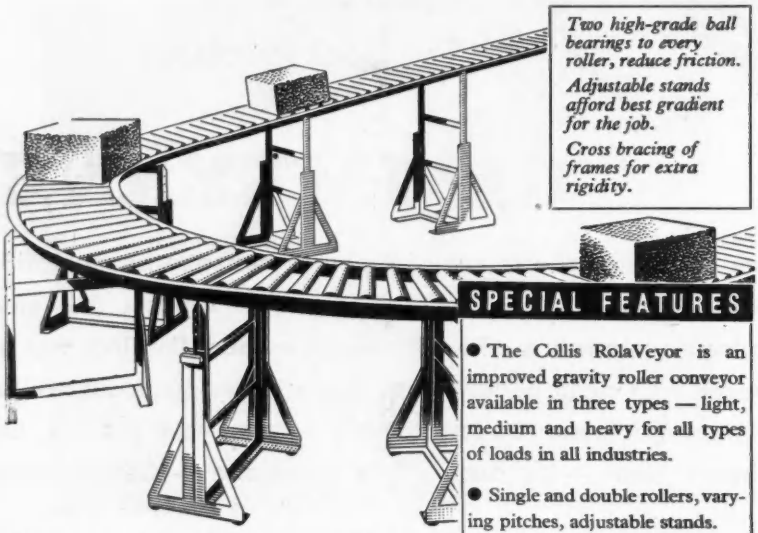

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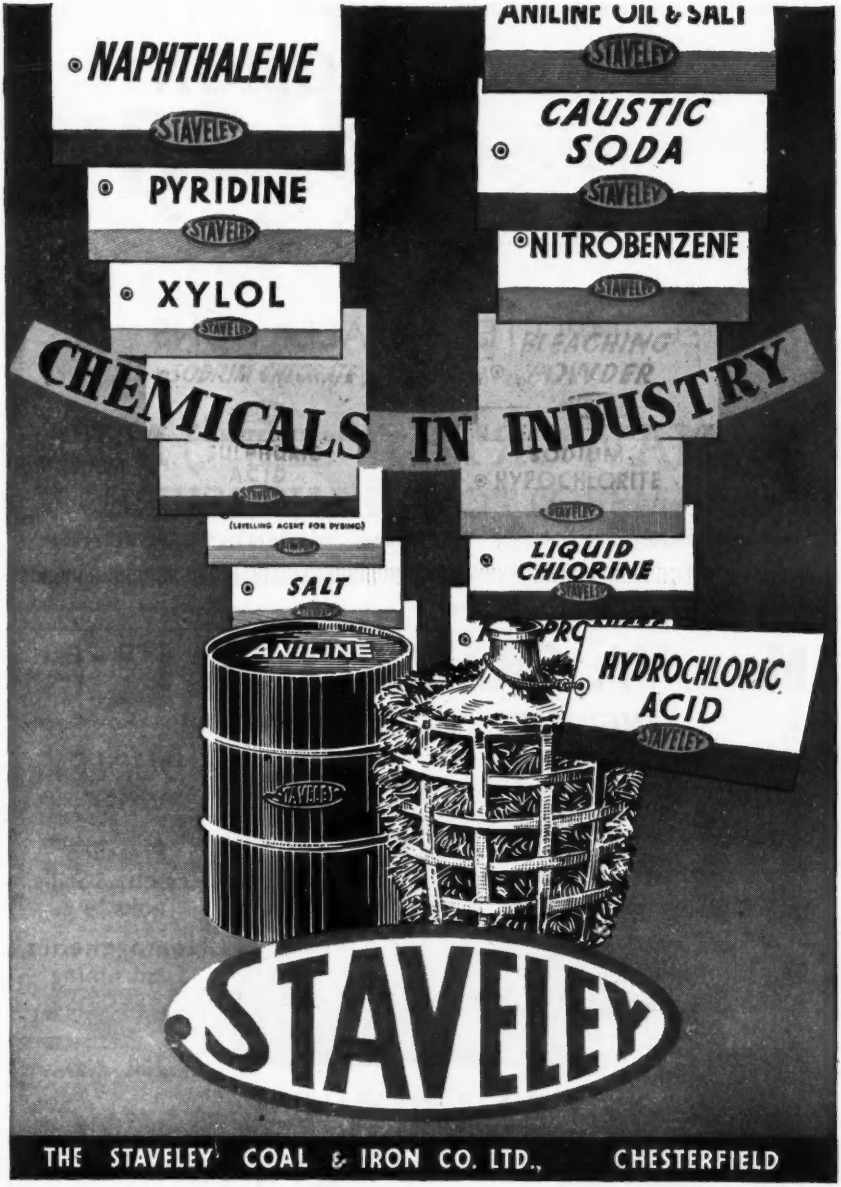
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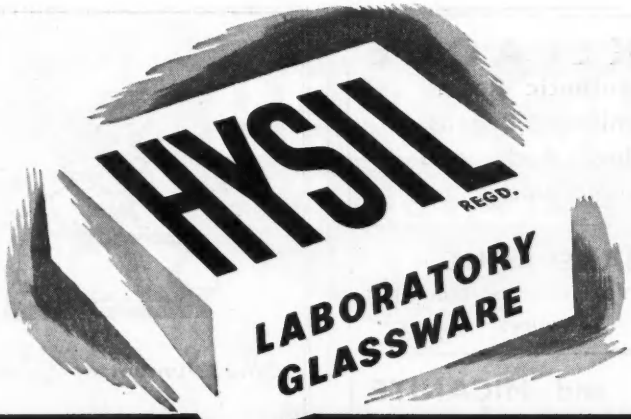

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Research as a Career

"WHAT shall I be?" is still as great a problem as ever it was, though for different reasons. Before the first world war, the difficulty was to decide in what line there were the best prospects of obtaining employment. One might, of course, have a special bent, and then nothing would stop one; but that was not very usual, and most people drifted into whatever industry first offered them a job. To-day, there is a shortage of labour, and an even greater shortage of trained staff. The Ministry of Labour has published a whole series of booklets telling the young man and woman how to go about the business of choosing a trade or profession, what qualifications are needed and how these can be obtained. Many professions, through their professional bodies, are publishing books on careers. Industries tend to do the same thing. Private firms are also not behind the times and several of them have explained what careers are open to those who enter into their employ. These books have dealt with chemistry and physics—mostly as applied to specific industries—with engineering, with accountancy, and with the whole range of the more reputable trades and professions.

What appears to us to be new ground is broken by a book that has lately come into our possession entitled: "Research as a Career," written by Dr. R. A. Collacott and issued by the Advisory Bureau for Research. We are a little uncertain from what angle to view this work, for it appears to be written with a view partly to suggesting that one method of entering into the research field is to start as a washer-up of laboratory apparatus. We do not doubt that there have been eminent research workers who have started that way, being highly gifted both with brains and the capacity for hard work. It is, as this book rightly says, the hard way by which to enter research as a profession and it is not usual for those who enter in this way to progress very far up the ladder. More usually they will drift away into more practical directions and may ultimately end up as works managers. That is not "research as a career," however; it is research as a stepping stone to a career.

The first thing to be decided by the prospective entrant, and the question remains open in our view after reading the booklet, is "what constitutes research?" We do not ask this question purely in a spirit of criticism, but because it seems desirable that someone should give to the world a definition of research. No one would doubt that a professor in his laboratory bent on enlarging the boundaries of knowledge is engaged on research. At the other end no one would class as research routine testing of materials to ascertain their chemical composition and physical properties. The term "research," it is well to remind ourselves, has extended far beyond the bounds of science. We read of economic research, educational research, geographical research (once called "exploration," before the world became research-minded), historical research, legal research and even "market research"—a term we ourselves have been guilty of using. All this sounds very easy—until we begin to inquire what some of these terms mean. This present book

On Other Pages

provides an example: Dealing with market research we read that "field investigators are provided with a questionnaire which contains questions relating to the subject concerned which require a positive or negative reply, such as *Don't you use Blank's chewing gum? . . . If not, don't you like the taste? . . . Or the size?* The field investigator is required to approach people of different types and obtain their reactions to these questions." Is this research? Dr. Collacott seems to suggest that it is.

Turning from this example, we read that "unfortunately much of the research work carried out by chemists is of a routine analytical (character?), which causes much disappointment among qualified chemists who aspire to original research." Is routine analytical work to be classed as "research," even if conducted in a research laboratory? Again, it is stated that "researches into legal problems are commonly made by specialist solicitors or by junior barristers on the behalf of Counsel." What is the distinction between this sort of work and "consulting the literature," which is an ordinary event in the life of every professional man who wants to know what facts exists before he commits himself further. Is looking up facts in a textbook a form of research?

It is time that some clear definition was given about what constitutes research, for if it is not, the professional research worker will soon find that he is two-a-penny and that his prestige has gone. What shall we make of such a statement as this: "Research experience—in any sphere whatsoever—can be gained at home (as a hobby) in the manner suggested by the Advisory Bureau for Research." The basis of training for research must surely be that the research worker shall be thoroughly trained in advance in his subject or science before trying to enlarge the boundaries of knowledge. True research is something very different from the experimenting that any boy will do when given a laboratory in which to play. But the popular Press and many others who should know better, often confuse these things. The nation is "research-minded," but it will soon cease to be so if every goose is converted into a swan.

Whether a man enters the scientific profession in order to stay there or not, there is no doubt that the training provided by the research laboratory gives him an independent, original outlook which is most valuable in many walks of life. There are many holding high positions who started on a scientific career but got side-tracked for one reason or another. As Dr. Collacott puts it, "The advanced knowledge to be gained from research suits a person admirably for senior administrative posts, particularly in economics and commerce. For in the advanced study of particular problems a person develops an idea of the difficulties and means of overcoming other difficult problems; receives also an insight into the sources of information and meets those who are capable of giving help to solve the most baffling of difficulties." In the light of this fact does it matter whether the demand for research workers will continue on the present high level? Dr. Collacott is uncertain whether there will be such a demand in the future as is now being experienced. But there will always be a demand for the trained scientific mind. We doubt whether many young

people set out in life to make research their career. That comes after they are trained and are found to possess the necessary gifts. What is immediately necessary is that more first-class brains shall set out to become chemists and chemical engineers. They can safely be left to find their particular niche when they have been trained and given experience in industry.

NOTES AND COMMENTS

Reparations in Kind

WHATEVER foundation primitive war may have provided for the *Vae victis* dictum in ancient Rome there can be little doubt that the converse no longer holds good. The fruits of victory are few and almost invariably bitter. That must serve as consolation for the outcome of the long deliberations by the occupying Powers on the scale of German industry and the proportion and allocation of reparations. More than two years' experience of nursing Germany's moribund and disordered economy have persuaded the authorities to cut by more than half—to 682—the number of plants which were scheduled on the morrow of victory to go as reparations to the Allies; and of these 25 per cent go to the U.S.S.R. and Poland and of the remainder Britain is to receive 28 per cent —perhaps two years hence. Chemical undertakings earmarked for reparations, details of which are given on another page, number 42, and it is evident that Britain's 28 per cent of the Western nations' share of these will add much less to this country's chemical potential than some of the large-scale enterprises foreshadowed here in recent industrial news stories. And, notwithstanding the restriction of capital enterprise and building deadlocks, the latter are fairly certain to bear fruit first. Meanwhile, whatever long range prospects the chemical industry may have cherished of an effective accretion of strength from Germany's wartime equipment they are not encouraged by the semi-official statement this week that the U.S. Foreign Liquidation Commission are already offering to their home industry use of part of the dynamite plant near Hamburg and installations from the Lippoldsberg Paraxol plant.

World Oils and Fats

THE stringent world shortage of oils and fats should by now be news to no one—least of all perhaps the housewife, for whom the new cut in U.K. butter rations is another reminder on the domestic plane of a shortfall which is exacting its penalties in almost every sphere. Although the story has been told piecemeal repeatedly in home and overseas news items the complete picture was lacking until Mr. Geoffrey Heyworth, chairman of Lever Brothers and Unilever, Ltd., assembled the facts in their perspective at the recent annual general meeting of his companies. THE CHEMICAL AGE, in common with most other responsible journals, recognised (within the meagre limits of the paper ration) the value of Mr. Heyworth's study of what oils and fats the world may now count on, how much it lacks and of the prospects of making good the very formidable deficit. Those admittedly rather inadequate summaries of Mr. Heyworth's thesis which appeared in the Press have now been supplemented by the publication by the companies of the analysis in its entirety, quoting all the relevant data and representing, incidentally, a useful, timely lesson in economics.

Balance Destroyed

MR. HEYWORTH has given the factual background against which the present-day scarcity of fats must be seen. The annual world supply of oils and fats pre-war amounted to nearly 20 million tons, principally from the United States, India, China, the Dutch East Indies, the Philippines and the Argentine. Europe, excluding Russia, produced 4 million tons, mainly in the form of butter, animal fats and olive oil. But of this 20 million tons most remained in the countries where it was produced and only about 5¾ million tons a year was exported. Of the importing countries, the United States was only 85 per cent self-supporting and Great Britain only 10 per cent self-supporting. The net shipments of oils and fats to Europe, excluding Russia, were about 3½ million tons, *i.e.*, 61 per cent of the world production available for export. Two mil-

lion tons came from the British, Dutch, French and Belgian colonial empires and an additional three-quarters of a million tons from the British Dominions, mainly India and Australasia. War abruptly eliminated supplies from the Dutch East Indies, and they have not been resumed to the extent that had been hoped. Sumatra, which exported 220,000 tons of palm oil in 1938, now is prevented by political unrest from exporting anything. Manchuria, which exported the equivalent of half-a-million tons of oils and fats, is now sending a mere few thousand tons a month of soya bean. That story is repeated throughout the world. Increased consumption in producer countries and rising populations, which in the case of India has withheld more than two-thirds of pre-war exports, and a serious reduction in production of oils and fats in Western Europe have had the inevitable result. Mr. Heyworth does not disguise there is no magic solution; but he does stress one or two mitigating possibilities to which insufficient attention has been paid. Need international whaling be restricted to 320,000 tons of oil, compared with 500,000 tons pre-war? Price controls, moreover, though they cannot yet be wholly dispensed with, are producing inflated prices—as industry has good reason to know—and artificial conditions which are inimical to a continuing market supply. Normal interplay of supply and demand is an essential and it can be revived, says Mr. Heyworth, if food subsidies in this country were abolished and high prices followed by consumer resistance were allowed to play their traditional part.

Austria Can Do It

IT is a sobering fact that the highly-mechanised economy of Europe, when overtaken by one of the crises of its history, must look for salvation mainly to the labours of one class of its workers—the coal miners. The Reid Report of 1945—*vade mecum* of the British coal industry's problems—made it clear that whatever improvements might accrue from nationalisation, or from the introduction of more and better machinery, increased production depended upon the individual miner, his enthusiasm, and the regularity of his attendance. A recent report by the Allied Commission for Austria, makes the same point in relation to the Austrian coal miner. In drawing comparisons, however, it has to be remembered that over 70 per cent of British coal is mechanically cut, whereas in Austria, owing to the nature of the seams, the bulk of the 220,000 tons of brown coal mined every month must be hewn with the pick. Thus the remarkable maintenance of production tempo—in the first six months of this year nearly 1,500,000 tons of coal were produced (90 per cent of the pre-war level)—can be regarded as a laudable effort. The 8400 miners who work in the 16 mines of Styria and Carinthia hold in their hands the keys to Austria's recovery and their steady record of achievement has been maintained in the face of acute material shortages and difficulties. These results have been due to the spirit of enterprise and improvisation with which the manifold shortages have been met; in this respect, the rôle of the British advisers has been a leading one. The report deals with the labour problem, training scheme, with food, clothing and housing problems, and with the miner's social welfare. In the light of recent events, it is a document which everyone should study—especially, we suggest, the National Coal Board and the colliery force in this country.

Another Chemical Notation ?

AN entirely new method of naming chemical compounds by means of sets of ciphers was outlined in a paper presented at Birmingham University to the Royal Institute of Chemistry, the Society of Chemical Industry and the British Association of Chemists by Messrs. M. Gordon, C. E. Kendall, and W. H. T. Davison, of Fort Dunlop chemical research division.

Their paper, "Chemical Ciphering—A Universal Code as an Aid to Chemical Systemisation," indicated how any type of compound could be described, as far as its structure is concerned, by an arrangement of letters and numbers, which would probably be shorter than its traditional name. The scheme is specially adapted for use in conjunction with a punch card system on machines of the Hollerith type and the essence of it is that, for example, to search for all compounds having a certain atomic structure would be simplified as it would be necessary only to operate the controls on a mechanical sorting machine for all relevant cards to be immediately selected. The paper has been submitted to the Codification Commission of the International Chemical Union.

Scale of Reparations Announced

Britain's Small Allocation of Chemical Plants

BECAUSE German economy has been divided into Eastern and Western zones, independent of each other, the level to which German industry was to have been reduced by reparations and demolition has been drastically raised. That is the keynote of the statements issued last week on the authority of the British and American commanders-in-chief in Germany announcing that 682 industrial plants in the Anglo-U.S. occupied zones are to be dismantled and distributed as reparations, less than half the number of plants or installations listed in accordance with the Potsdam agreement. That agreement provided for the removal of 1636 plants or parts of plants.

42 Chemical Plants

The present schedule of plants for removal are divided as: War plants 302, ferrous metals 92, non-ferrous metals 11, chemicals 42, mechanical engineering 224, electrical engineering 4, shipbuilding 3, power plants 4. Of the total, 25 per cent will be allocated to Poland and Russia and the remainder among the other Allied nations. Of this residue Britain's share will be 28 per cent.

Plants Scheduled

The names of 42 chemical-manufacturing concerns earmarked for reparations have now been communicated to THE CHEMICAL AGE by the Foreign Office. On the assumption that the above percentage shares will apply with equal force to individual industries (which seems unlikely, but is the only basis upon which approximate calculations can at present be made) Britain will obtain possession of the plant and equipment of (at most) 10 of these factories, a Foreign Office official indicated. The complete list appended below relates in some cases to entire plants, and in others to parts of plants or sections.

A.G. FUR STICKSTOFFDUNGER, Knapsack: Activated carbon; acetone from acetic acid. BLUMBERG AND CO., Lintorf: Pyrotechnics. DYNAMIT A.G., Schlebusch: Glycerine distillation; trinitrotoluene. DYNAMIT A.G., Troisdorf: Nitropenta; Vulcan fibre; phenoplasts; celluloid. HENKEL & CO. G.m.b.H., Dusseldorf: Soap powder; distillation of glycerine. I.G. FARBENINDUSTRIE, DORMAGEN: Perlon U.; ELBERFELD: Cellulose derivatives, miscellaneous resins; HOLTEN: Ethylene oxide, ethylene dichloride; LEVERKUSEN: "Sulfigran" (sodium sulphide by hydrogen reduction of sodium sulphate), Atebrin, polyamides, miscellaneous resins, hydrazine, hydrate of activated carbon, nitration of toluene; UERDINGEN: Electrolytic chlorine and caustic soda,* alkydal resins; ZWECKEL: Ethylene oxide, ethylene dichloride, polyethylene, bleaching powder. I.G. SAUERSTOFFWERK, Duisberg: Liquid oxygen and bottled industrial oxygen. KABELWERK DUISBERG ABTEILUNG ZUNDERFABRIK, Mulheim: fuzes and detonators. OXO-GESELLSCHAFT, Oberhausen: Higher aliphatic alcohols. PYROTECHNISCHE FABRIK HANS MOOG, Wuppertal: Pyrotechnics.* PYROTECHNISCHE LABORATORIUM W. NORRES, Dorsten: Pyrotechnics. V.D.M. HALBZEUGWERKE SPRENGKAPSELNFABRIK, Leverkusen: Detonators.* VEREINIGTE ZUNDER AUG KABELWERKE, Lage/Lippe: Fuzes. WECKE FERD. NACHF., Wuppertal: Pyrotechnics. DONAR G.m.b.H., Wesermunde: Pyrotechnics. SCHICKERT, OTTO & CO., A.G., Rhumspringe: 85 per cent hydrogen peroxide (including power station). SCHICKERT, OTTO & CO., A.G., Bad Lauterberg: 85 per cent hydrogen peroxide. BURMESTER, GUSTAV, Trittau: Pyrotechnics.* STOLZENBERG, Altona: Gas masks. ANORGANA, Gendorf: Chlorine and caustic soda; acetaldehyde; glycol. DR. ALEXANDER WACKER, Burghausen: Plastics (based on cellulose acetate); solvents. I.G. FARBEN, Gersthofen: Wax. KOPP & CO., Munich: Soap products. CHEM. WERKE V. TRANSCHE & CO., Gersthofen: Hydrazine hydrate. VEREINIGTE FLOSSPOTWERKE, Stulln: Hydrofluoric acid; sodium fluoride; synthetic cryolite; potassium bifluoride; sodium fluoro silicate. ELECTROCHEMISCHE, Munich: Concentrated hydrogen peroxide KALLE & CO., A.G., Wiesbaden: Methylethyl- and cellulose types of products. CHEM. WERKE KURT ALBERT, Wiesbaden: Phenoplasts (moulding powder). M. KAPPUS, Offenbach: Soap Products. I.G. FARBEN, Hoechst: Uresin; polyvinyl acetate; carboresin; sulphur black; solvents; chlorinated solvents, dinitrobenzene. P. S. MOBBS, Giessen/Lahn: Soap products. ROEHM & HAAS, Darmstadt: Soap powder. I.G. FARBEN SAUERSTOFFWERKE, Griesheim: Industrial gases. KASSELL-MITTELFELD: Industrial gases. DEUTSCH PYROTECHNICS FABRIK, Cleeborn: Pyrotechnics. KRAEMER & FLEMMER, Heilbronn: Soap products. SALINE LUDWIGSHALL, Bad Wimpfen: Sodium fluoride; aluminium fluoride; synthetic cryolite.

Prohibited Industries

Although this list is represented as being final, some small changes are still likely to be made and the plants of which Germany was to have been deprived on security grounds by decision of the Control Council

* Already Allocated

DISTILLERS' EXPANSION PLANS

SPEKE TO BE PURCHASED : SUBSIDIARY FOR STREPTOMYCIN

A £2,000,000 expansion of plant to provide large increases in the manufacture of solvents, plasticisers, acetic acid and anhydride at the Hull works of British Industrial Solvents (a subsidiary of the Distillers Company) was referred to by Mr. H. J. Ross, deputy chairman of the Distillers Co., Ltd., at the annual general meeting in Edinburgh on October 15.

A reorganisation of the plastics group is also being carried out with a view to centralising and increasing manufacturing operations at Barry, South Wales. New plants for subsidiary companies which will produce a range of synthetic resins, adhesives, moulding powders, and compounds are in course of erection. The cost of these extensions will also be about £2,000,000.

Penicillin and Streptomycin

Mr. Ross said that an agreement had been reached with the Ministry of Supply for the company to take over the Speke penicillin factory, which the company had erected and operated as agents for the Ministry. "The demand for penicillin," the report points out, "is still increasing, and it is considered that this acquisition will fit in logically and effectively with the company's research and development work in the production of streptomycin and in the field of anti-biotics generally." This new development will be operated through a subsidiary company to be formed with a capital of about £1,000,000.

It was hoped that a new plant for the manufacture of the plastic polyvinyl chloride, which will be marketed under the name "Geon," will be in operation soon. Progress in the general programme has, however, been disappointing due to serious shortage of construction materials and to changing degrees of priority.

Petroleum Chemicals

Confirmation was given in the report of the provisional agreement between the Distillers Company and the Anglo-Iranian Oil Company for the erection of a large plant for the production of chemicals from petroleum. Details of this scheme have already been published. Subject to the approval of the authorities, it is proposed to establish the factory at Grangemouth, close to the oil refineries of the Anglo-Iranian Oil Company. But the report warned that a considerable time must elapse before this scheme can be completed.

Last week-end was announced the registration of British Petroleum Chemicals, Ltd., the product of the Anglo-Iranian and Distillers Companies agreement. Although it is understood that the undertaking will require some £5 million to capitalise it, the new private company has been registered with an initial capital of £100. The declared objects of the company are "to manufacture, treat and turn to account chemicals, whether derivatives or compounds of petroleum, natural gas, or shale oil, or of any other nature, etc."; and its registered office is at 21 St. James's Square, S.W.1. (Details about the board of the new company appear in the Personal column.)

Scale of Reparations (*Continued from p. 559*)—

in March last year are not included. This decision prohibited the production of aluminium, beryllium, vanadium and magnesium and sanctioned only temporarily the manufacture of ball bearings, synthetic oil, synthetic ammonia and synthetic rubber. A final decision as to the future of these plants has still to be made and, meanwhile, these and surplus shipbuilding plants are not included in the list.

For a number of reasons, the official statement makes it clear, no early receipts of reparations are to be expected. Dismantling, it is anticipated, will take more than two years and additional postponements may arise from the necessity not to curtail drastically German employment or the attempts to re-establish a self-supporting economy. On the other hand, dismantling and removal of a few plants is already in hand and there have been several intimations that some plants are already being offered to American industry.

September's Record Exports

U.K. exports last month reached a value higher than any figure recorded since the war—£102,403,533. This, together with a reduction of imports to £160,708,411, against £174,039,765 in August, resulted in a reduction of the adverse balance of trade by £18,500,000. The adverse balance in September was still £58,300,000. Cars and machinery figure largely in the increased export total and much of the cut in imports is associated with food.

Fireworks Too

This year's seasonal fireworks displays will be affected by the Government's export drive. This is the implication of a statement reported to have been made by a spokesman of Messrs. Brocks last week. The firm's export target has been increased from 10 to 30 per cent, while it may be as high as 50 per cent next year.

Atomic Energy Reports

Widening Scope of Official Information

ANOTHER substantial addition has been made to the available authoritative literature on atomic energy in the publication by the Ministry of Supply of a list of a further 73 B.D.D.A. reports from the Government files. The latest summary comprises the lists already notified, of which the last—B.D.D.A. Nos. 74-98—appeared in our October 4 issue. Particulars are now recorded of 73 reports additional to the list recently given. These, too, are available for purchase from H.M. Stationery Office, P.O. Box 569, London, S.E.1, in the form of prints 9 in. by 7 in. from microfilms. The Crown retains the copyright and reproduction of these documents is not permitted. The following are the additions to he list recently published, quoting the B.D.D.A. number of each report, its title, author and date and the price including postage.

B.D.D.A. No.

1. Investigation of the Delayed Neutron Emission from Fission Products, using a Modulated Source of Primary Neutrons. (N. Feather, Aug., 1941.) 3s. 6d.
2. Streamline Flow through a Pipe of Rectangular Cross-section. (R. Peierls, Nov., 1941.) 1s. 6d.
3. On the Possibility of a Slow-Neutron Chain Reaction. (O. R. Frisch, Nov., 1941.) 3s. 6d.
4. Separation of a Mixture of Three Components. (R. Peierls, Nov., 1941.) 2s. 10d.
5. On the Counting of Neutrons using a Thick Layer of Hydrogen-rich Material and a 'Proportional' Counter. (N. Feather, March, 1942.) 3s. 6d.
6. Directional Correlation in Fission Processes: Calculations relative to Possible Experiments. (N. Feather, April, 1942.) 5s. 6d.
7. The Motion in a Self-fractioning Centrifuge. (P. A. M. Dirac, May, 1942.) 6s. 10d.
8. Isotope Analysis of Uranium Samples by means of their α-Ray Groups. (O. R. Frisch, June, 1942.) 5s. 6d.
9. Absorption Measurements on the Radiations from 239U and 239X. (N. Feather, July, 1942.) 18s. 3d.
10. Determination of Number of Neutrons emitted from a Source. (J. Rotblat, Oct., 1942–Jan., 1943.) 13s. 7d.
11. Note on the Theory of Supersonic Diffusers. (F. Friedlander, Nov., 1942.) 10s. 3d.
12. Flow in the Gap between the Impeller and Diffuser. (F. Friedlander, Jan., 1943.) 4s. 10d.
13. Energy Distribution of Fission Neutrons. (R. Peierls, Nov., 1942.) 1s. 6d.
14. On a Modification of an Experiment suggested by Holt, Peierls and Frisch. (N. Feather, Nov., 1942.) 3s. 6d.
15. The Blast Wave due to an Intense Explosion. (G. J. Kynch, Dec., 1942.) 7s. 7d.
16. The Equation of State of Air at High Temperature. (K. Fuchs, G. J. Kynch and R. Peierls, Dec., 1942.) 15s. 7d.
17. Determination of the Total Neutron Collision Cross-Section for Hydrogen and Carbon. (E. Bretscher and E. B. M. Murrell, Jan., 1943.) 10s. 11d.
18. The Ratio between Absorption Cross-Sections of B. and H. (H. Halban, F. Fenning and H. Seligman, Jan., 1943.) 3s. 6d.
19. Fluorinated Lubricants. (J. R. Park, Jan., 1943.) 10d.
20. Some Theoretical Results on the Flow in Supersonic Diffusers. (F. Friedlander, Jan., 1943.) 8s. 11d.
21. Use of a Small Boron Chamber for Measuring Absolute Yields of Neutron Sources. (L. Kowarski, S. G. Bauer, H. Freundlich, A. N. May and H. Seligman, Jan., 1943.) 8s. 3d.
22. On a Shock Wave Problem Arising in the Theory of Supersonic Diffusers. (F. Friedlander, Jan., 1943) 5s. 6d.
23. Density Distribution near a Point Source. R. Peierls and B. Davison, Feb., 1943.) 4s. 10d.
24. Light Absorption by Two Black Hemispheres. (O. R. Frisch and R. Peierls, Feb., 1943.) 4s. 2d.
25. Regularities in Successive β-Disintegrations. (N. Feather, April, 1943.) 8s. 3d.
26. Boundary Conditions in the "Modified Diffusion Theory" for the Neutron Density Distribution in Presence of a Container (incomplete). (B. Davison, May, 1943.) 23s.
27. Boundary Conditions in the "Modified Diffusion Theory" for the Neutron Density Distribution in Presence of a Container (incomplete). (B. Davison, March, 1944.) 14s. 3d.
28. The Blast Wave due to an Intense Explosion. (J. Howlett, April, 1943.) 19s. 8d.
29. On the Counting of the α-Particles emitted by "Semi-Thick" Layers of Uranium: Effect of the Variation of Stopping Power with Velocity. (N. Feather, June, 1943.) 3s. 6d.
30. α-Particle Group Analysis using a Parallel-Plate Ionisation Chamber: Effect of Variation of Stopping Power with Velocity. (N. Feather, June, 1943.) 2s. 2d.
31. The Estimation of Deuterium in Water by the Temperature-Float Method. (W. A. Bell, July, 1943.) 12s. 11d.
32. On the Flow of Gases through Expanding Pipes. (F. Friedlander, July, 1943.) 14s. 11d.
33. Part I: Approximate Rate of Neutron Multiplication for a Solid of Arbitrary Shape and Uniform Density. (P. A. M. Dirac, Aug., 1943.) 7s. 7d.
34. Part II: Application to the Oblate Spheroid Hemisphere and Oblate Hemispheroid. (P. A. M. Dirac, K. Fuchs, R. Peierls and P. Preston, Aug., 1943.) 11s. 7d.
35. A Comparison of the Approximate Methods of Calculating the Critical Size of a Sphere. (A. H. Wilson, Aug., 1943.) 3s. 6d.
36. The Loss of Energy by Fission Fragments at High Temperatures. (G. J. Kynch, July, 1943.) 5s. 6d.
37. Physical Properties of Some o-Compounds. (W. N. Haworth, Aug., 1943.) 10d.
38. Reduction in Neutron Density caused by an Absorbing Disc. (T. H. R. Skyrme, Sept., 1943.) 13s. 7d.
39. Detector Response to Neutrons Slowed Down in Media Containing Cadmium. (E. Broda, H. Hereward and L. Kowarski, Sept., 1943.) 12s. 11d.
40. Escape of Energy from a Cylindrical Ionisation Chamber. (T. H. R. Skyrme, Oct., 1943.) 4s. 10d.
41. The Critical Radius and the Time Constant of a Sphere Embedded in a Spherical Scattering Container. (B. Davison and K. Fuchs, Nov., 1943.) 21s.
42. Critical Radius for a Hemisphere with a One-sided Infinite Container. (B. Davison, Nov., 1943.) 6s. 2d.
43. Differential Diffusion through a Capillary. (G. J. Kynch, Dec., 1943.) 5s. 6d.
44. Measurement of the Concentration of U235 in a Sample of Uranium Oxide enriched in this Isotope. (B. B. Kinser and S. J. Cohen, Dec., 1943.) 4s. 2d.

(*Continued overleaf*)

B.D.D.A. No.

45. Barium 139 as Fission Indicator. (E. Broda, Dec., 1943.) 2s. 2d.
46. Szilard-Chalmers Effect in Permanganate Solutions. (E. Broda, Jan., 1944.) 2s. 2d.
47. A Neutron Standard. (E. Bretscher, G. B. Cook and G. R. Martin, Jan., 1944.) 6s. 2d.
48. Determination of the Number of Neutrons Emitted by a Radium-Beryllium Source. (E. Bretscher, A. P. French, G. R. Martin and M. J. Poole, Feb., 1944.) 5s. 6d.
49. The Effect of Small Departures from the Spherical Shape upon the Critical Size and Time Constant of a Sphere. (A. H. Wilson, March, 1944.) 5s. 6d.
50. Alpha-Ray Analysis of X-Isotopes. Part I. Apparatus. (F. L. Clark, H. Spencer-Palmer and R. N. Woodward, May, 1944.) 19s.
51. Tests Concerning the Reproducibility of the $RaBeF_4$ Neutron Standard and its Calibration as a Source of Neutrons. (D. H. Wilkinson, June, 1944.) 12s. 11d.
52. The Critical Size and Time Constant of a Spheroid. (H. Fairbrother, June, 1944.) 16s. 3d.
53. The Energy Spectrum of the Neutrons from the Lithium (p,n) Reaction. (B. B. Kinser and S. G. Cohen, June, 1944.) 4s. 2d.
54. Critical Radius of a Hemisphere Completely Surrounded by a Container. (P. D. Preston and B. Davison, July, 1944.) 8s. 3d.
55. The effect of Anisotropic Scattering on the Multiplication in a Sphere. (A. H. Wilson, July, 1944.) 3s. 6d.
56. Note on the Investigation of Spatial Asymmetry in Fast Neutron Fission, using a Double Ionisation Chamber and Pulse Analyser, and its Possible Bearing on the Problem of Large Capture Cross-Sections at High Energies. (N. Feather, July, 1944.) 6s. 2d.
57. Iodine 131 and 133 as Fission Indicators. (E. Broda, Sept., 1944.) 2s. 2d.
58. On a Possible Method of Investigating the Back-Scattering of α-Particles under Conditions of "50 per cent. Geometry." (N. Feather, Sept., 1944.) 2s. 10d.
59. On the Distribution of Pulse Sizes in a Parallel-Plate Ionization Chamber containing a Thick Layer of Hydrogen-Rich Material Irradiated with a Parallel Beam of Neutrons. (N. Feather, Sept., 1944.) 2s. 2d.
60. On the Distribution of Pulse Sizes in a Parallel Plate Ionisation Chamber containing a Thick Layer of Hydrogen-rich Material Irradiated with Neutrons (II): Effect of Oblique Incidence. (N. Feather, Oct., 1944.) 2s. 2d.
61. A Rapid Colorimetric Method for the Determination of T in Solutions of TO_2F_2+HF, by means of Hydrogen Peroxide. (A. A. Smales, Nov., 1944.) 4s. 10d.
62. Chance Coincidences between Non-Random Sequences, with particular reference to Experiments using a Cyclotron Source. (N. Feather, Jan., 1945.) 15s. 7d.
63. X-Ray Powder Patterns of some X-Metal Compounds. (H. S. Peiser and T. C. Alcock, March, 1945.) 5s. 6d.
64. Upper Limits of the Fission Cross-Sections of Lead and Bismuth for Li-D Neutrons. (P. K. Wright, April, 1945.) 2s. 2d.
65. The Range/Energy Relation for α-Particles of 0-5.3 MeV. in Ethylene and Polythene. (D. H. Wilkinson, May, 1945.) 9s. 7d.
66. A Photographic Plate Study of Neutrons from the D-D Reaction. (D. L. Livesey and D. H. Wilkinson, May, 1945.) 20s. 4d.
67. Differential Diffusion Through a Capillary (Part I. Mathematical). (G. J. Kynch, June, 1945.) 12s. 3d.
68. The Assignment of the Slow-Neutron-Produced Activities of Thallium and the Dual Disintegration of Radium E. (E. Broda and N. Feather, June, 1945.) 13s. 7d.
69. Preparation of a Strong Thin Polonium Source and Preliminary Experiments on the Yield of (a,n) Reactions. (E. Broda and P. K. Wright, July, 1945.) 7s. 7d.

(*Continued at foot of column two*)

Companies Act Reviewed

Wider Powers of Investigation

IN an address to the Chartered Institute of Secretaries in London last week, Sir Arthur Fforde, a member of the Cohen Committee on Company Law Reform, dealt with certain sections of the new Companies Act, and in particular with the wider powers given to the Board of Trade to investigate company activities.

The main purpose of the Act, said Sir Arthur, is to ensure that shareholders receive better information on their company's affairs which, in future, may be investigated if 200 or more shareholders, or if shareholders holding one-tenth of a company's shares so desire. Another sphere in which the Board can now exercise the right of investigation relates to ownership and control.

Director's Status

With regard to the election of directors, there is no alteration in the position of directors of private companies who on July 18, 1945, were holding office for life. Resolutions affecting the status of a director now require special notice, and must be communicated at once to the director concerned so that he can not only attend the meeting, but also make representations direct to the company.

A new provision is that a director's share dealings have to be disclosed. Annual meetings, he thought, should be regarded as being of greater importance. On the question, "What can be moved at an annual general meeting?" he said that the new Act overrides the articles of association and Table A of the 1929 Act, by which the business of an annual general meeting is governed at present. "It seems," he said, "that the question what can 'properly be moved' at the annual general meeting is, so far as the Statutes are concerned, at large."

Lower U.S. Mercury Output.—According to figures issued by the U.S. Bureau of Mines, mercury production in the second quarter of the current year declined by 7 per cent to 5700 flasks. It is also reported that Spanish producers have lowered their price by $22 to $82 in order to recapture their former share in the important American market.

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70. Differential Diffusion through a Capillary, Part II. (G. J. Kynch, Aug., 1945.) 17s. 8d.
71. Measurement of a Flux of Fast Neutrons with a Counting Pressure—Ionisation Chamber. (K. W. Allen, Aug., 1946.) 12s. 11d.
72. The Application of the Photographic Plate to the Quantitative Determination of Activities by Track Counts. (E. Broda, Aug., 1946.) 8s. 3d.
73. The Permeability of Metals to Argon and Helium. (British Non-Ferrous Metals Research Association, Oct., 1946.) 4s. 10d.

PRINCIPLES OF PRESSURE SPRAY NOZZLES

by H. L. M. LARCOMBE

ALTHOUGH nozzles of various kinds have been used in the gas and heavy chemical industries for many years, not much information bearing on this equipment is to be found in the literature. Methods of spray-drying and spraying of fungicides and insecticides have become increasingly important, while the plastics industry too is finding more and more uses for pressure nozzles.

The following article gives information on pressure nozzles which may be useful to chemical engineers.

The basic factor in all spraying equipment—whether for spray-drying or other purposes—is the spray nozzle, which in the present stage of development can be classified into three broad groups: (a) pressure nozzle, (b) two fluid nozzles or atomisation nozzles, (c) centrifugal spinner nozzles.

In this paper it is proposed to deal only with pressure nozzles. These depend primarily on the flow of a liquid, solution or slurry through an orifice under pressure, so forming an unstable jet which breaks up into droplets of varying characteristics. The nozzle may or may not be fitted with a device for imparting a spinning effect to the jet. The pressure may vary from 5 to 1000 lb. per sq. in., depending on the viscosity, surface tension and density of the fluid and the nature of the droplet required.

Many Applications

Pressure jets can themselves be grouped into several sub-groups developed to meet the requirements of varying applications. These different types of pressure nozzle have different spray forms and different discharge capacities for the same pressure depending on their construction. The applications of these different nozzles are numerous and are tabulated in Appendix A, but this list is by no means exhaustive, nor are the applications hard and fast.

Another factor which has to be considered is that of materials of construction which may have to be corrosion resistant or erosion resistant (*e.g.*, in the case of handling slurries) or both. High discharge capacities at high pressures may reduce the life of the nozzle by cutting the orifice, deforming the spray form and altering the size of droplet.

This is important in the case of spray drying where the size of the droplet eventually decides the sieve analysis of the finished product. Hard steel orifices, sintered orifices and jewelled insert orifices are used to combat wear.

Somewhat surprising in view of their wide applications is the comparative scarcity of literature about spray equipment. Kleinshmidt[1] in U.S.A., and Doble and Halton[2] in Great Britain, have published works on the subject. There is a certain amount of material available on oil atomisation in diesel engines, but this has limited application in industry.

Of Practical Use

The material presented here does not approach the subject from the theoretical angle but attempts to give information which can be put to immediate use in choosing and constructing nozzles and determining the performance which can be expected from them. The information has been obtained from various sources and covers actual figures obtained from proprietary types of nozzles and experimental types. References will be made to certain specific applications which offer interest, but generally the information is generally applicable.

Another source of information on the construction of nozzles is patent literature. Most of the nozzles detailed in patents are of involved construction and are designed usually with one particular fluid in mind and the proportions have been determined with regard to the characteristics of that fluid. It is difficult to decide whether patent specifications indicate any reliable line of approach to designing a nozzle for a particular fluid. There is, however, one trend which is clearly shown and that is the tendency to impart rotary motion to the fluid before it reaches the orifice.

Droplet Formation

The spray nozzle performs three distinct functions—breaking up the fluid into droplets or particles of the proper size, forming these particles into suitable shape and distributing the particles into a certain spray form.

The mechanism of spray formation consists in first drawing out the fluid into thin sheets, threads or filaments. All these forms are very unstable and under the combined action of surface tension, internal viscous forces, and turbulence of the gas into which the liquid is being sprayed, they break up into droplets. If the liquid has any rotary motion as it passes through the jet when the pre-droplet characteristic is a thin, cone shaped filament or sheet; if no rotary motion is present the pre-droplet characteristic is a thread form.

These two distinct types of pre-droplet characteristic are very important in certain

applications. In spray drying, a sheet characteristic will give a resulting particle of hollow aerated structure giving a low density powder, whereas a thread characteristic will give more solid particles, resulting in a high density powder. Fig. 1 shows various constructions of nozzle with and without rotary motion and indicates the type of spray formation obtained.

It will be seen from Fig. 1 that the rotary motion of the liquid through the orifice forms a widening conical film which is converted into droplets. A very interesting phenomenon is apparent in the formation of such drops. The motion of the air past a surface at high velocity gives rise to turbulence.

Effect of Turbulence

If the surface is not rigid, as with the fluid sheet at the exit of a nozzle, the action of the turbulence on the surface creates a series of waves. When the sheet is acted upon on both sides by the turbulence (like a flag flying in a breeze) the waves build up very quickly and cause a whipping effect on its surface so that it curls back on itself. The result of this curling back is to form a hollow tube of fluid which, because it is unstable, breaks down into hollow spheres. This characteristic is an aid in spray drying as the hollow spheres are dried or chilled into particles of the same formation. Here is the explanation of the low density product produced by this type of nozzle.

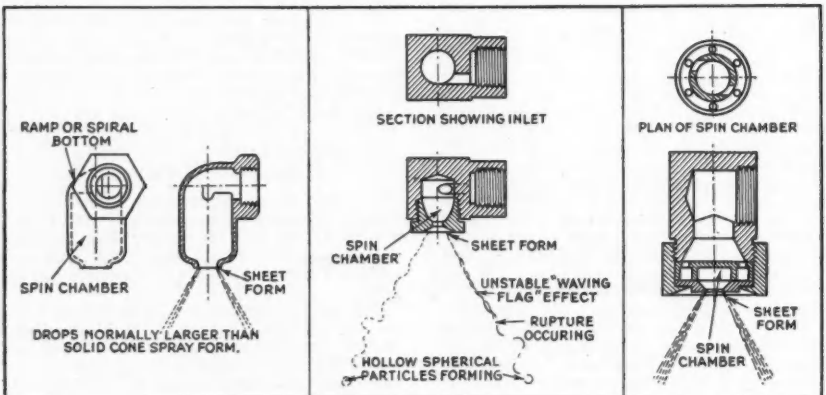
Edgerton and Germeshausen in the U.S.A. have succeeded in photographing this action which Fogler and Klemschmidt[3] reported. The photography showed clearly this whipping action and also the cone formation from which it originates. The photographs also show the effect of pressure and viscosity in a centrifugal type pressure nozzle.

By some means, usually a spin chamber, a rotary motion is imparted to the fluid just behind the orifice. When the pressure is too low to create any appreciable rotary motion the fluid is forced out in an initially smooth stream which begins to ripple and breaks into large drops. If the pressure is increased it begins to form a hollow cone which increasing pressure spreads and ruptures into droplets. With viscous fluids the thickness of the cone filament is, of course, thicker than with less viscous fluids.

"Bubble" Formation

It has been proved by spraying hot fluids into relatively cold atmospheres that the hollow particles are not formed by expansion of vapour within the particle, as was thought, but by the "flag waving" mechanism described earlier and illustrated by Edgertons' photographs.

The above paragraph and the paper quoted[2] are recommended particularly as a



	1	2	3
TYPE	RAMP OR SPIRAL BOTTOM	TANGENTIAL INLET	TANGENTIAL INLET
SPRAY FORM	HOLLOW CONE	HOLLOW CONE	HOLLOW CONE
PRE-DROPLET INITIATING FORM	SHEET	SHEET	SHEET
NORMAL ORIFICE DIAM. RANGE	1/8" TO 1 3/8"	0·037" TO 0·218"	1/16" TO 1/2"
PERFORMANCE REFERENCE	FIG. 5.	FIG. 6.	SEE BIBLIOGRAPHY (2)

Fig. 1

study for workers interested in spray drying.

In gas scrubbing, where a good dispersion is required, another important point is raised in droplet formation, that of recombination. If good dispersion of droplets of a similar size is not achieved, recombination will take place to the detriment of the scrubbing action. Gas atomisation gives little trouble with recombination since all particles are carried away with approximately equal velocity.

Gas atomisation, however, has drawbacks so far as application to scrubbing is concerned because of its long and slender spray form with little contact area. With pressure nozzles, which are usually used, the question of dispersion and recombination demands more consideration. Assuming droplets are to be projected from the nozzle into still air and that they are of a size to obey Stokes' Law, they will travel into the air for distances approximately proportional to their respective diameters before air friction brings them to stage where gravity is the only force acting on them. The smaller particles will therefore tend to collect in considerable numbers nearer the nozzle than the larger particles which will, because of their greater travel, collide with the smaller which will combine with them on impact.

In view of this it will be seen that a narrow droplet size range is desirable if recombination is to be reduced to the absolute minimum. If the droplet size distribution were accurately known it would be possible to calculate the probable amount of recombination.[1] This is seldom possible, however, and indicates the desirability of maintaining a vigorous gas flow.

Size Distribution

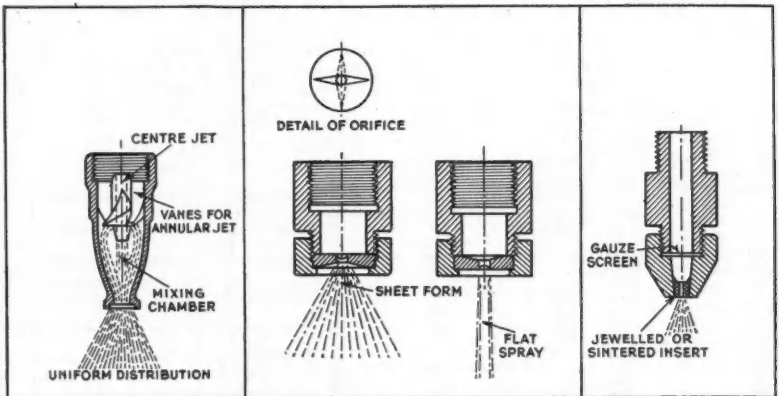
A small amount of research on size distribution of droplets has been carried out[4]. This, however, has been insufficient and further information is required on the following: (a) Distribution of drop size in the spray; (b) velocity of the drops; (c) recombination of drops.

These three characteristics are important in the specification of any spray nozzle. Different designs give different values of the above even when the orifices are the same size and when the nozzles are operated under the same pressure. There are some experimental data on a few nozzles, but nothing adequate. The technique for obtaining this information has been worked out[2, 5] and it is suggested that manufacturers should carry out studies to tabulate these characteristics.

Johnstone and Williams[6] have given a formula for the probability of collision of the drops of a given diameter, d_1, with the drops of any given larger diameter d_2 within the distance dL to be:[1]

$$\frac{d\eta_1}{\eta_1} = -\frac{\pi}{4}(d_1 + d_2)^2\eta_1\left(\frac{v_2 - V_1}{V_1 V_2}\right)dL$$

These workers also give a formula for the



4	5	6
CENTRE JET	FAN SPRAY	MISTING
SOLID CONE	FLAT FAN FORM	NO PARTICULAR SPRAY FORM DROPS TO SMALL
THREAD	SHEET	THREAD
3/64" TO 3"	0·031" TO 0·375"	0·012" TO 0·04"
FIG. 4.	FIG. 7.	FIG. 8.

Fig. 1

fraction of the drops that succeed in passing through any short movement of distance (in which, L may be considered constant) without combination with any of the larger drops[2]:

$$\frac{\eta_1'}{\eta_1} \doteq -\sum\left[\frac{\pi}{4}(d_1 + d_1)^2\,\eta_1\,(\Delta\,\theta_1 - \Delta\,\theta_1)\right]$$

[V_1 = Linear velocity of particles d_1 in diam.
V_2 = Linear velocity of particles d_2 in diam.
L = Length of path of drop.
$\frac{\eta_1'}{\eta_1}$ = ratio of number of drops of diameter 1 leaving the section to that entering.
d_i, η_i, $\Delta\,\theta_i$ = diameter, number, and time of passage respectively, of that size group of order i greater than 1.
$\Delta\theta$ = quotient of the increment of distance by the average velocity.]

From the distance velocity curves the combination of the drops may be estimated by a step by step method.

From the total number of collisions and the probability of collision with each group's size the number of drops growing into a larger group size can be estimated when the coalescence results in a substantial increase in size. After this rearrangement of the size distribution for a short increment of the distance, a second step can be calculated as indicated above until a distribution could be given for any length of drop path. An illustration of this method is shown in Fig. 2.

Drop Size and Distribution

The energy relations for the formation of droplets can be grouped into three parts.

DISTRIBUTION OF SIZES OF DROPLETS FROM SPRAY NOZZLE—$\frac{1}{16}$ IN. ORIFICE

Dia. of Drops. Microns	No. of Drops Measured	No. of Drops per C.C. of Spray	Percentage of Volume	Area pr C.C. of Spray sq. cm.	Percentage of Area
25	878	97,250	0.072	1.9	1.48
50	460	51,000	0.334	4.0	3.12
100	190	21,000	1.11	6.6	5.15
150	89	9,850	1.75	6.9	5.38
200	53	5,870	2.46	7.4	5.78
250	33	3,650	3.00	7.2	5.61
300	22	2,440	3.46	6.9	5.38
350	16	1,770	3.97	6.8	5.3
400	13	1,440	4.83	7.2	5.61
450	11	1,220	5.84	7.8	6.09
500	10	1,107	7.25	8.7	6.79
550	8	886	7.74	8.4	6.55
600	7	776	8.79	8.8	6.87
650	6	664	9.59	8.8	6.87
700	5	554	9.68	8.5	6.64
750	4	443	9.84	7.8	6.08
800	3	332	8.94	6.7	5.22
850	2	221	7.13	5.0	3.9
900	1	110	4.22	2.8	2.18
950	0	0	0	0	0
1,200	0	0	0	0	0
Total	1,811	200,583	100.0	128.2	100.0

(Each size group includes drops in a range equal to the interval between groups, centring about the nominal size—*i.e.*, the 100 group includes drops from 51–149 microns).

1. The energy required to form the surface against the surface tension of the fluid which is the surface tension times the additional surface.

2. Since the time during which the droplets are formed is very short, very often a matter of microseconds, the rate of deformation of the liquid is very high and the viscous forces become very large. The energy required to produce the deformation is, therefore, appreciable although very difficult to calculate.

3. The energy lost due to inefficient application of energy to the fluid. This can be high in the case of badly designed nozzles, especially of the vortex type.

Pressure nozzles compared with gas or steam atomisation nozzles reveal extremely important differences. The energy which can be imparted to a lb. of liquid in the form of pressure is very small in comparison with the energy available in a lb. of air or steam. To illustrate this it can be shown that the energy available in a lb. of steam at 60 p.s.i.g. could only be equalled in a pressure nozzle by exerting 15,000 p.s.i.g. to a lb. of liquid water.

In spray drying the pressure nozzle has certain advantages over the steam atomisation type. Owing to the relative velocity and intimacy in the steam atomisation type of nozzle enormous rates of heat transfer can be expected and in view of the low temperatures which can exist in such nozzles due to adiabatic expansion, the fluids are chilled by the low temperatures. This tends to set primary particles rapidly if they are thermoplastic and prevents surface tension from acting to round the particle. An irregular shredded particle results. This is often not desirable in the product as it tends to interfere with a consistent sieve analysis.

(*To be continued*)

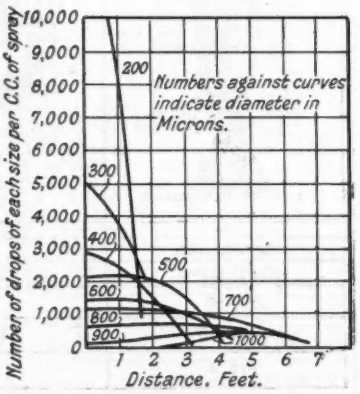


Fig. 2

French Oils and Fats—II

Summarised Results of Recent Research

THE application of X-ray diffraction methods to the study of soaps has been made possible as a result of Prof. J. J. Trillat's investigations in 1926 in the formation of metallic soaps, in which he observed not only the soap spectrum but also that of the excess fatty acids superimposed thereon.

This is one of the facts which the professor reveals in " X-Rays in the Study of Fats " (Part II, March, 123-130) which *Oleagineux* has published. He was thus able to study the structure of different soaps: mono-, bi-, and tri-valent.

Prof. Trillat illustrates his latest researches by reference mainly to lead soaps, but includes some also of mercury, potassium, and sodium, with various saturated fatty acids. From these studies he has been enabled to deduce the mechanism of certain reactions such as the fixing of oxygen on the double bonds of an unsaturated fatty acid (oleic, etc.), a matter of considerable interest in connection with drying oils.

Light on Lubrication

He proceeds then to deal similarly with alcohols, esters, amides, fats, waxes, polymethylene derivatives and ketones. Work with the fats in particular has thrown further light on the intricate mechanism of lubrication; and also in the study of fatty esters of cellulose in which there is periodicity varying with the number of carbon atoms (*Chim. et Ind*, 1944, *51*, 1).

The author notes that the method of oriented layers had indicated the importance of physical state and also of the support, and of rate of crystallising on orientation. Thus, if the support shows alkaline reaction (glass, mica) orientation is very good; but, if acid, there is no orientation. Further, it appeared to be of interest to see how orientation would occur on the surfaces of liquids, and this led to the design of a new method (in 1929) known as the tangential drop, the basic principles of which are described (see also *Jnl. de Physique*, 1929, Jan., *32*). The author is continuing his work at the Centre National de la Recherche Scientifique, Bellevue.

Natural anti-oxidants of palm oil. (May, 242-246.) Prof. P. Dubouloz and co-workers have already undertaken much research in this field and published several papers in *Bull. Soc. chim. Biol.*, 1941-5, they take a very modest view of the results so far achieved. The general problem of natural anti-oxidants in oils is still very obscure and they regard their work as fruitless on many points; but amid the darkness they believe some light may be discerned.

They believe at least one element, tocopherol, has been definitely identified as an ant-ioxidant in palm oil. In collaboration with the I.R.H.O. they have continued their work at the Lab. de Physique de la Faculté de Medecin et de Pharmàcie de Marseille, and conclude provisionally that oils originating from a certain species of oleaginous plant may well vary in respect to anti-oxidants both from various natural causes affecting the plant and from different mehods of preparation; the same as had been found with animal fats. These agents are present only in very small amounts and their isolation presents many difficulties.

Like other workers in the U.S.A. they, too, have used molecular distillation methods. So far, it is thought possible to study the different anti-oxidants in a given oil, to the extent, at least, of distinguishing them provisionally and stating the order in which they disappear during progressive oxidation of the oil, beginning first with those sensitive to alkalis.

Esterification of some higher fatty acids, with methanol and ethanol in the presence of catalysts; M. Loury and Mlle. M. T. Mellier (May, 254-259). Reference is made to the prior work of Gault and Chablay (*Comptes Rendus* Ac. Sc. 1941, *213*, 177) who showed that the acids—palmitic, oleic, lauric—esterified with methyl alcohol follow Berthelot's laws of chemical equilibrium; but the present authors have found that ethyl alcohol acts differently from methyl alcohol, permitting a more rapid reaction.

This greater reactivity of methyl alcohol may be explained either by the lower stability of the R-OH bond or by postulating some form of steric inhibition.

Lauric acid was prepared by methanolysis of palm-kernel butter, and palmitic acid similarly from palm oil, followed by saponification. These two, and also oleic acid, were esterified, using as catalysts hydrochloric or sulphuric acid, sulpho-benzene or sulpho-toluene in weak solution. Generally, it was found that excess alcohol favoured esterification, and that this could be completely attained with methyl alcohol in a relatively short time and at room temperature.

Edible palm oil. A letter (May, 265-6) from the Director of the Department of Agriculture, Malaya (Kuala Lumpur), describes some early attempts to produce edible palm oil, starting with the work of Dr. F. G. Reed, of Sungkai, Perak, and Prof. J. L. Rosedale, of the College of

Hydrogen Peroxide Development

Possibilities for Small Power Plant Operation

TWO chemical engineers of the Buffalo Electro Chemical Co., Buffalo, N.Y., in a report to a recent meeting of the American Institute of Chemical Engineers in New York, said that concentrated hydrogen peroxide—a tool of war that the Germans developed and the Allies duplicated—has great possibilities in the development of small power plants.

Hydrogen peroxide was used by the Germans with calcium permanganate to launch their V-1 bombs. The chemical reaction set up by these two materials is of explosive violence, but if controlled properly, can be used for useful work. According to the authors, this same reaction was used to drive turbine pumps in V-2 rockets, for powering rocket aeroplanes such as the Messerschmitt 163 at higher speeds than any of the propeller-driven planes, and for driving torpedoes and high-speed submarines.

When the Allies learned about the mechanism of the German V-1, the U.S. Chemical Warfare Service was assigned the task of developing a process for making highly concentrated hydrogen peroxide and calcium permanganate. The Buffalo Electro Chemical Co., Inc., was one of the firms approached. At that time, completely independent of any known Government need, the Buffalo Electro Chemical Co. engineering staff had completed a study of this difficult manufacturing problem and were ready to undertake its production.

Although small quantities, up to concentrations of 99 per cent, had been made in laboratories, this was the first time that the manufacture of a 90 per cent product had been attempted on a large scale. It is available in any reasonable quantities. The highest strength that had been manufactured for commercial purposes up to that time was 50 per cent.

Industrial Uses

"Research has been devoted to possible industrial applications of this new high concentrated hydrogen peroxide", the report runs. "The reduction of the water content from the bleaching grades has produced a substantially new chemical; 90 per cent hydrogen peroxide has certain applications for operating small power plants where the factors of space and weight per horse-power are of paramount importance. It can also be used to supply additional oxygen to boost internal-combustion engines to meet emergency conditions. Although 90 per cent hydrogen peroxide itself is not sensitive to shock, in admixture with certain organic solvents it produces powerful explosives. These mixtures have the advantage over such explosives as dynamite and nitroglycerine in that they can be transported separately to demolition scenes without any hazard, yet upon mixing, some of these hydrogen peroxide-organic solvent mixtures are as powerful as TNT and have the additional advantage that they produce no nitrogenous poisonous gases."

French Oils and Fats (*Continued from p. 567*)—

Medicine, Singapore, who recommended palm oil for cooking purposes in 1934. Some publications of 1935-6 are noted, and reference made to the use of palm oil in the Far East during the war, as a makeshift, in the absence of anything better. The letter concludes by stating there has now been a complete revulsion of taste and the demand is now negligible.

Food Investigation

The I.R.H.O. nevertheless attaches great importance, under present conditions, to the use of palm oil for food, and it may take a permanent place in the world's diet of the future. It claims to have introduced a special method of fractionating the glycerides of palm oil whereby this aim may be more surely achieved. (April, 175-185.)

Four short papers on the subject are contributed by MM. R. M. E. Michaux, R. Carrière de Belgarric, P. Mensier, and M. Loury, with illustrative coloured plate.

It is known that the melting point of a mixed glyceride is generally lower than that of the homogeneous glycerides of the same acid, especially if one of the esterifying acids is not saturated; and the m.pt. of a blend of these mixed glycerides will be still lower if a certain amount of homogeneous glycerides of non-saturated acids is added.

These considerations induced the Centre de Recherche of the I.R.H.O. to apply to palm oil the methods of fractional crystallisation already widely used in oils and fats technology, *e.g.*, by Buckley in Malaya in the case of glycerides of non-saturated acids of palm oil.

By this method and careful attention to cooling, the oil could be separated into two parts: one liquid at normal temperature and the other melting at about 104°F., the ratio of liquid to solid being approximately 1 : 2. The former makes a good table oil equal to groundnut or olive oil, while the latter is a solid white fat, usable direct as cooking fat or for margarine manufacture.

American Chemical Notebook

From Our New York Correspondent

REFLECTING recent sharp increases in the United States in the costs of raw materials and drums, the Du Pont Company has announced increases of one-half to three-quarters of a cent per lb. in the prices of its chlorinated solvents—perchlorethylene, trichlorethylene and methylene chloride. The new price of trichorethylene delivered is now 10¾ cents per lb. in lots less than a carload, 10 cents per lb. in carload of drums and 9½ cents in tank cars, as compared with 10, 9¼ and 9 cents. Equivalent rates for perchlorethylene are 11½ cents per lb., 10¾ cents, and 10¼ cents, as compared with 10¾, 10¼ and 9¾ cents per lb. New methylene chloride prices are 13½ cents, 12½ cents, and 11½ cents, compared with 13, 12 and 11 cents. Du Pont has also announced that its new contact sulphuric acid works at James River, Virginia, has started operations and first shipments have just been made. The new unit is operated by the Grasselli Chemicals Department.

* * *

Mr. Philip B. Fleming, Federal Works Administrator and chairman of the President's Conference on Fire Prevention, has called for a co-ordinated effort to reduce the fire hazard involved in loading and transporting ammonium nitrate from American ports to foreign countries. "Nearly two-fifths of the solid nitrogen produced in the United States in 1947-48 will be in the form of ammonium nitrate," Mr. Fleming said. "A thorough study of the causes of ammonium nitrate combustion is imperative, but it would be a grave loss if the material should become so burdened with prohibitions and restrictions that it would not be available as fertiliser." Experts of the War and Agricultural Departments of the United States, municipal agencies and industrial and civil organisations directly interested in the chemical are now discussing safety measures for its manufacture, loading, and transportation.

* * *

The National Aniline Company's plant at Buffalo will be expanded under a programme expected to cost more than $20,000,000.

* * *

A new process for the production of synthetic gasoline from low-grade coal and lignite has been developed by V. F. Parry, E. O. Wagner, A. W. Koth and B. J. Goodman, of the United States Bureau of Mines, Golden, Colorado. In the new process, soft coal or lignite is poured in at the top of a double-walled cylindrical oven. Steam is introduced as the coal slides down between the walls toward the bottom of the retort, which is heated to about 1900°C. The steam and hot coal react to form synthesis gas, a mixture of hydrogen and carbon monoxide. This is piped off through a vent in the inside wall.

* * *

Continuing the downward trend that has been evident during the past three months, production of primary aluminium in the United States in June declined 6 per cent, measured on a daily basis, compared with May production, according to the Census of the Department of the Interior. This lapse in 1947 from near-capacity output of operating reduction works followed the suspension of production at the Longview plant of the Reynolds Metals Company. Leading secondary smelters on June 18 announced price cuts of ½ to ¾ cents a lb. on various resmelt grades. Production of primary aluminium in June totalled 46,259 short tons, according to official figures released last week. This compares with 53,032 short tons produced in March, 1947 (greatest total production for any month since August, 1944) and is the lowest since October, 1946.

* * *

The Disco Company, a subsidiary of the Pittsburgh Consolidated Coal Company, has announced plans for construction of a smokeless fuel-producing plant at Champion near Pittsburgh. The new plant, estimated to cost $3,000,000 will produce 280,000 tons of coke annually.

* * *

Completion of a new plant at Pittsfield, Mass., for the manufacture of magnesium oxide by the (U.S.) General Electric Company's chemical department, was announced last week by John L. McMurphy, manager of the Compound division. Mr. McMurphy said that the new plant, which will occupy about 10,000 sq. ft., will double General Electric's capacity to produce magnesium oxide. The new plant is equipped to purify, densify and grind crude magnesium oxide.

* * *

Seven chemicals are listed by the Bureau of Entomology and Plant Quarantine of the U.S. Department of Agriculture among those which proved reasonably efficient in the control of termites by soil poisoning in a series of unfinished experiments being conducted at Beltsville, Maryland. The seven chemicals are: sodium arsenite, lead arsenate, sodium fluosilicate, cryolite, phenothiazine, pentachlorophenol, and orthodichlorobenzine. In a preliminary report of results, the scientists emphasise, however, that soil poisoning is, in the main, a measure supplementary to primary termite-control methods of a structural nature, which offer permanent protection.

Sale of Trade Secrets

BETRO Defends its Dollar Scheme

AS a result of recent criticism of BETRO's offer last month to help negotiate the sale of British patents and "know-how" in return for royalties in dollars, Lt.-Col. H. A. P. Disney, BETRO's Administration Director, gave an informal talk to the Press in the organisation's library, Dover Street, London, W., on Thursday last.

Answering British criticism that BETRO is advising British manufacturers to sell their trade secrets for a "mess of pottage," Col. Disney emphasised that manufacturers were urged to take this course of action only if their products cannot be exported, *e.g.*, where there are import bans or where the cost of manufacture in this country for sale abroad is not an economic proposition.

Fostering Competition

Replying to suggestions from the Press that BETRO advice could only lead to the setting up of competition abroad, Col. Disney explained that it is customary to include in the contracts, clauses forbidding sales in areas of interest to British manufacturers. On the question of the possibility of U.S. licensees improving upon British patents and "know-how" and thus being in a position to put British manufacturers out of business at the expiration of the agreement (usually for the duration of the life of the patent, but sometimes 5 or 10 years) the speaker reminded his critic that it was usual to include a clause providing for interchange of developments between licensor and licensee.

Recalling U.S. criticism that BETRO's activities in that country threatened to violate U.S. Anti-Trust Laws, he denied that conditions would be imposed with that object in view. "What are the Anti-Trust Laws, anyway?" he asked. "Surely it is up to the U.S. manufacturer to safeguard himself?"

Willing Buyers

According to Col. Disney, the scheme has already produced a crop of inquiries from both sides of the Atlantic with U.S. requests for "know-how" so far exceeding British offers to sell. Among the latter, however, are a process for making unshrinkable woollens, a soot destroyer, and a cleaning compound. American inquiries have included rubber goods, plastics, nuts, bolts and screws, and textiles.

Asked whether BETRO is prepared to assist any British firm, Col. Disney said that in theory the organisation's services were available only to members, and that membership is open to all firms upon payment of an annual subscription of £100. "However," he continued, "we should not refuse our help to non-members."

Next Week's Events

SATURDAY, OCTOBER 25

North of England Institute of Mining and Mechanical Engineers. (Associates and Students Section). Lecture theatre of the Institute, Newcastle-upon-Tyne, 1, 2.30 p.m. General meeting. Mr. Donald Hindson: "Some Aspects of Dutch Coal Mining."

Royal Institute of Chemistry. Oak Restaurant, 18 Kensington High Street, W.8, 7 p.m. Dance.

MONDAY, OCTOBER 27

Institution of the Rubber Industry. (Manchester Section). Engineers' Club, Albert Square, Manchester, 6.15 p.m. Mr. B. Gordon Darnton: "Incidentals in Latex Treatment."

Birmingham University Chemical Society. University, Edgbaston, Birmingham, 4.30 p.m. Dr. J. Sheridan: "Newer Views on Multiple Bonds and their Reactions."

TUESDAY, OCTOBER 28

Royal Institute of Chemistry. (Leeds Area Section). Chemistry Lecture Theatre, The University, Leeds, 6.30 p.m. Mr. R. K. Dickie: "The English Oilfields."

Society of Instrument Technology. Royal Society of Tropical Medicine and Hygiene, Manson House, Portland Place, W.1, 7 p.m. Messrs. J. O. V. Vick, C. Ramond, and W. Lindsay: "The Organisation of an Instrument Department in an Industrial Works."

WEDNESDAY, OCTOBER 29

Institute of Welding. Institution of Civil Engineers, Great George Street, London, S.W.1, 6 p.m. J. L. Adam: The Presidential Address.

Society of Chemical Industry. (Food Group). Burlington House, Piccadilly, W.1, 6.30 p.m. Professor A. Haddow and Dr. L. A. Elson: "Food and Cancer."

Royal Institute of Chemistry. Woolwich Polytechnic, Woolwich, S.E.18, 7 p.m. J. G. N. Gaskin: "The Examination of Questioned Documents."

FRIDAY, OCTOBER 31

British Association of Chemists. (Scottish Section). St. Enoch Station Hotel, Glasgow, 7 p.m. Short Papers and Discussion.

ALUMINIUM IN TASMANIA

FOLLOWING a one-year survey of territory near Launceston on the River Tamar, Tasmania, the Australian Government has decided upon the establishment of an aluminium industry there. This is the effect of an announcement by Mr. J. Armstrong, Minister of Munitions, to the Senate last week. Preliminary estimates indicate that there is sufficient bauxite for 30 years of full production.

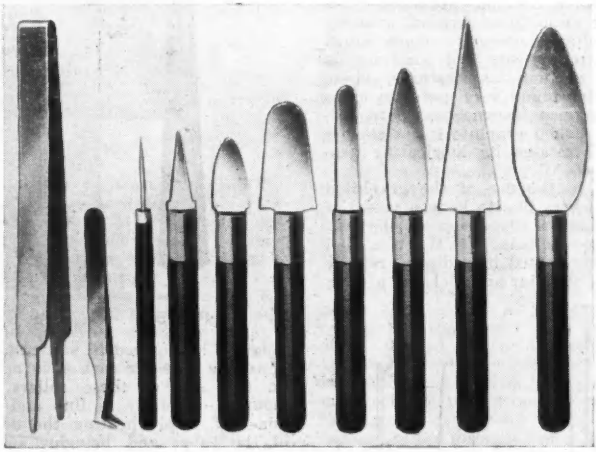
GLASS IN THE LABORATORY—VII

Tools and Accessories Used in Lamp Working

by I. C. P. SMITH, B.Sc., F.R.I.C.

THE tools employed by the lamp worker are usually simple and many workers like to make up their own to suit their own style of working. However, sets of these tools are available and one such set is depicted in Fig. 1. The functions of the different tools will be described later in the articles describing the actual working of the glass, but the following are the points to look for in well-made tools.

The blade of the tool should be of a hard brass, thickness No. 16 or No. 14 s.w.g., so that it is not too easily bent when it is hot. The blade should be well fixed to the handle in such a manner that it will not loosen after repeated heatings. The handles should be fairly small in diameter, not more than ½ in. for the larger tools and down to ⅜ in. for the small ones, so that they may be easily rotated in the fingers. The edges



A B C D E F G H I J

Fig. 1

of the tools should be nicely rounded—not brought down to sharp edges.

In addition to the spike shown—C in the figure—many workers like to have a heavier one of about ¼ in. diameter, and a "marlinspike," as shown in Fig. 2, having a protecting flange for large hot work. For flattening-off purposes also the disc tool, Fig. 3, is employed, or a piece of hard flat graphite with a handle similar to that depicted in Fig. 4; in this a piece of electric conduit tubing is split, opened and shaped to form the handle; cardboard or thin asbestos is used between the metal and the graphite to ease the grip of the clamping screws.

Fig. 5 shows a small tool employed for rapidly opening flanges, and it is provided with a handle consisting of a length of ¼ in. diameter mild steel rod. The tool itself is made from one of the light alloys.

For shaping sockets, particularly of standard ground joints, hexagonal tools as shown in Fig. 6 are employed. They have been habitually made from a hard graphite, but owing to supply difficulties they have also been made satisfactorily in light alloy. These tools are provided with a steel rod for a handle. In addition, some workers use a simple flat tool as shown in Fig. 7 although its use requires greater skill. The sides are carefully finished to 1 in 10 taper, inclusive, and a tool is made for each size of socket. These tools are useful for finishing the ends of tubes for corks, etc., as an alternative to instrument G in Fig. 1. The construction shown—a hard-soldered joint in the rod, and the rod firmly located in the handle—is a sound one for these tools.

Some simple form of lubricant is always required for metal tools in order to prevent staining of the glass and to enable the tool to slide easily over the hot glass. Beeswax

has been habitually employed for this purpose but it is liable to form a scaly or resinous residue and in addition it is sometimes scarce. There is a lubricant available, however, consisting of paraffin wax

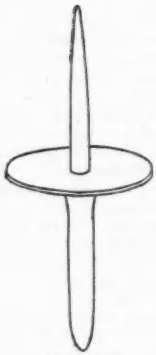


Fig. 2

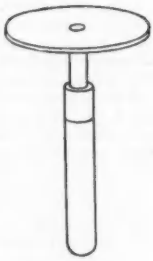


Fig. 3

mixed with some colloidal graphite. This wax may have, in addition, a small quantity of a body of high molecular weight which will increase its viscosity and cling to the metal surface at high temperatures. These waxes have been found very useful in cases where the tool may become heated to redness, as the colloidal graphite is not rapidly burnt off and retains its lubricating properties up to 600°C.

In addition to the use of the graphited wax, many workers like to keep a vessel of water containing a dispersion of the colloidal graphite (aquadag). When a tool has become over-heated it is dipped rapidly into this vessel of water and picks up a layer of the colloidal graphite. The dispersion is made by adding 5 oz. of distilled water to, say, ½ oz. of the aquadag; this ensures proper mixing of the dag through the water, and use of distilled water ensures that the colloid is maintained in suspension. Colloidal graphite in the wax form or as aquadag or oildag may be used in many places in the mechanical handling of glass as in bench moulding, lathe working, etc. Fig. 8 shows a simple holder for flasks either for shaping the necks or joining side tubes on to the body of the flask; the arms are opened or closed by turning the handle. The holder is available in two sizes, which cover the usual sizes of flask up to 1 litre capacity. Fig. 9 is a diagram of a simple machine used for rolling a tube, as when flanging the ends, etc. It is adaptable to any size of tube up to about 4 in. diameter, and enables a comparatively unskilled worker to turn the tube steadily in the flame. For joining large tubes together in line two of these rests may be employed for each tube.

Fig. 5

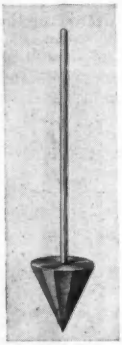


Fig. 6

When it is required to join two long lengths of tubing together each tube may be rested on two sets of these rollers, which are mounted carefully in line and the joining done by simply heating the adjacent ends of the tubes and bringing them together while on the stands.

It is frequently necessary to adapt an odd end of the working bench or table for glass working and in doing so it is well to make provision for unexpected requirements. The gas lead for the main blowpipe should be fully ⅝ in. B.S.P. fitted with a mains cock and a rubber tubing teat which is bored out fully ⅜ in.; alternatively, a short length of ⅝ in. gas barrel may be employed for the teat. A second smaller gas tap is required for miscellaneous purposes such as an arrangement for keeping hot materials, etc., when doing complicated work, or for using the small cutting jet. A third gas point at

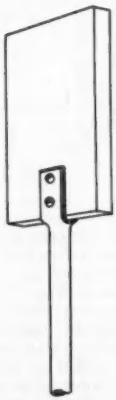


Fig. 4

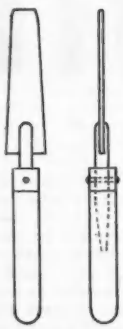


Fig. 7

the back of the bend is a useful adjunct for feeding a second blowpipe set at the back when carrying out large work. This should be controlled from the front of the bench as should the corresponding air point.

Fig. 8

Air leads should be at least ¾ in, B.S.P., preferably ⅞ in. This need for ample size of gas and air leads is stressed here, because very few pet-cocks or rubber connection teats of an alleged B.S.P. size have anything like this bore right through the stop-cock or teat. Some can be drilled out, but mains-cocks generally are advocated. Many otherwise good blow-lamps are spoiled by inattention to this point. When allowing for gas and air consumption,

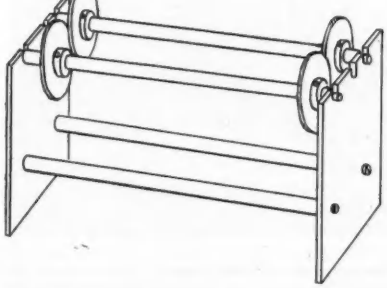


Fig. 9

20 cu. ft. per hour may be required for the gas, and 3 cu. ft. per minute for the air for each blowpipe. (The different units are in accordance with current usage.)

(Figs. 1, 5 and 6 are reproduced by courtesy of Messrs. A. Gallenkamp & Co., Ltd., and Fig. 8 by courtesy of Messrs. Townson & Mercer, Ltd.).

Air Filtration

Work on Micro-Organisms

AT the first meeting of the current session of the Institution of Chemical Engineers, North-Western Branch, at The College of Technology, Manchester, a paper, "The Removal of Micro-Organisms from Air by Filtration," was presented by Messrs. S. G. Terjesen and G. B. Cherry. The paper described a method of producing large quantities of sterile air required to aerate the fermenting magma for such a biochemical process as the manufacture of penicillin.

The technique of Bourdillon, Lidwell and Thomas, it was explained, was selected as a reliable method of collecting and counting air-borne micro-organisms. The bacterial concentration of the inlet air used in these experiments was increased by infection with a suitable tracer organism and the air was passed through a separate pilot filter to avoid the disturbance of the conditions on an operating plant.

The filter consisted of a 3-in. thick slab of slag- or glass-wool, covered with supporting gauzes and fixed between perforated plates. Gaskets were used and pressure was applied to give a tight joint. When necessary, a backing of swansdown cloth can be used to exclude fibres from the filtered air.

Dust was removed from the inlet air by a bag filter and the air was mixed with a fine spray of a bacterial suspension produced by a Collison Inhaler. The droplets rapidly dried to give suspended single organisms in the air-stream. The air was filtered and then tested for bacteria by the above technique.

Slag-wool Effective

Staph. albus was used in some experiments, *B. subtilis* in others, and as the number of these organisms in the filtered and unfiltered air could be counted by the technique used, the efficiency of filtration was calculated. Fine slag-wool fibre was more efficient than a coarser glass-wool, but the former cannot be sterilised by steam because of the formation of channels through the filter. Air at 180°C. was a successful sterilising agent. It was found that packed towers containing oil and caustic soda solution, respectively, were useless for the removal of suspended single organisms, whereas the 3-in. pre-formed slabs of slag-wool were efficient.

Scottish Chemical Notes

(From Our Glasgow Correspondent)

CHEMICAL engineering and industrial experts were present at an inspection of the new East Kilbride town site, near Glasgow, last week. Board of Trade officials and Development Corporation members accompanied the party which is understood to have considered the suitability of East Kilbride as a centre for chemical engineering developments.

* * *

Chemical engineering concerns are still worried by an acute shortage of components and accessories which makes it extremely difficult to maintain anything like a regulated delivery of production. Demand is still very strong indeed and there is every indication that both home and export buyers will maintain pressure for some considerable period ahead. The chief anxiety at the moment is the steel shortage. Output is particularly limited by the shortages of such items as electric motors, which prevent manufacturers from even starting production since space considerations generally do not permit the storage of partially completed plant.

Delivery of various components is often delayed for periods of 18 to 24 months, with the result that ultimate delivery date for the finished equipment can be only a matter of speculation. Another problem with which some engineering concerns are increasingly confronted is the tendency abroad to reduce imports, although there is rather less fear of this where capital goods, such as machinery or chemical plant, are concerned. There seems to be a tendency to take the maximum available supplies of this type of plant and equipment in order to develop the home industries in those countries with a view to dispensing with the need for finished imports.

* * *

Staggering of working hours in the heavy engineering industries has been successfully demonstrated on the evidence of the first week's working, Saturday morning attendances in chemical engineering works being even higher than on normal working days.

It is the undoubted intention of the Regional Board to overhaul all the schemes now operating, and to enforce staggering where it has not been accepted voluntarily. Had the engineering industries proved "difficult" the Regional Board's task would have been rendered more difficult. It is believed in Glasgow that the Board will achieve a complete survey by January and that chemical firms not at present staggering or achieving the desired economy will be made to comply with compulsory schemes.

Among new companies registered here last week is Caledonian Plastics, Ltd., general electrical engineers, etc., of 70 Constitution Street, Leith. The company's nominal capital is £1000.

* * *

Many industrial concerns expect a more rigorous control over river pollution to result from the publication of the report of the Committee on Estimates, in which reference was made to river pollution in Scotland. Evidence showed that there was no adequate preventative control in Scotland comparable with that of England. Industrial concerns including paper works, chemical works and other concerns were using rivers solely as the most economic method for disposing of effluents. There is little doubt but that a far greater critical attitude is developing among local authorities, and that firms will no longer be permitted to pollute rivers or sea areas with impunity.

* * *

Plans have been completed for the revival of the slate quarrying industry on the islands of Seil, Luing, and Easdale, off the West Coast. The industry has suffered from competition by concerns nearer to the main centres of population—mainly the quarries of Wales—and because of the development of synthetic roofing products which has largely replaced slate on many housing schemes. The advent of cheap power to the West Highlands and eventually throughout the whole of the Highlands has rather altered this position, and has placed the Scottish slate industry once again in a position where it can compete with other slate industries and competitive roofing materials.

Official Notices

Admendments to Poison Rules

The Home Office has announced that it is intended to amend the Poison Rules, 1947, of the Pharmacy and Poisons Act, 1933. A copy of the intended amendments may be obtained from the Under Secretary of State, Home Office, Room 132, St. Stephen's House, Victoria Embankment, London, S.W.1. Any representations in regard to the amending rules should be addressed to the Under Secretary of State, Home Office, St. Stephen's House, Victoria Embankment, London, S.W.1, not later than November 24, 1947.

Non-Ferrous Scrap

The Ministry of Supply announces that brass scrap 70/30 ingot is now available from Government stocks at a price of £104 10s. 0d. per ton ex works.

Chemical Export Targets

INDIVIDUAL export targets for fine chemicals and pharmaceuticals were the subject of discussion by manufacturers and the Government departments concerned at a meeting last week in London. This meeting was a sequel to the announcement in September by the President of the Board of Trade to representatives of the chemical industry of the export levels he hoped to see attained.

The Government departments at last week's meeting were the Ministries of Supply and Health and the Board of Trade (Raw Materials Department, Industries and Manufactures Department, and Export Promotion Department); and industry was represented by members of the Association of British Chemical Manufacturers, the Wholesale Drug Trade Association, the Pharmaceutical Export Group, the Proprietary Association of Great Britain and the Proprietary Remedies Export Group, and the British Animal Medicine Makers' and Allied Traders' Association. The trade unions were also represented.

The importance of ensuring the provision of supplies for the maintenance of the health of the community was stressed, and it was recognised that this was the first charge on output. The difficulties facing the industry in expansion of export trade were discussed, and the departments concerned undertook to afford all practical assistance in this connection. A further meeting will be held in two months' time.

BENZENE EXPLOSION COSTS THREE LIVES

A VIOLENT explosion was felt throughout a large area of East London in the early evening of Friday last week when an accumulation of benzene vapour ignited at the chemical works of Messrs. A. Boake Roberts & Co., Ltd., Stratford, E.15. The fire which followed blazed furiously for two hours before it was brought under control by the N.F.S. Three operatives—Sidney Rounds, Walter W. Holmes and Robert C. Bushby—lost their lives. A number of other men received injuries.

Serious damage was confined to the actual plant in which the explosion and fire occurred, leaving wreckage equivalent to that of a high explosive bomb. THE CHEMICAL AGE is informed that adjoining plants which received slight damage will soon be in operation again.

Graphic evidence of the destructive effect of the blast is supplied by this view of the wreckage at the Stratford factory secured as soon as the fire service had extinguished the blaze that followed the explosion

COMPANY MEETING

Powell Duffryn, Ltd.

Future Prospects

THE Annual General Meeting of Powell Duffryn, Limited, was held in London on October 22, Mr. Edmund L. Hann, chairman and managing director, presiding. The following is an extract of his statement:

The business of Cory Brothers & Co., Ltd., in Egypt, which has been merged in that of Tractor & Engineering Co., S.A.E., is working smoothly and profitably.

Stephenson Clarke, Ltd., has, in association with other well-known shipowners, extended its shipping interests through the formation of Coastwise Colliers, Ltd. Losses of tonnage through enemy action are gradually being made good, and it is hoped in the next few years to restore fully the amount of tonnage owned in 1939.

I have to report the appointment of Mr. Robert Foot as a managing director of Powell Duffryn and chairman of its new subsidiary company, Powell Duffryn Technical Services, Ltd., which was formed in March of this year to act as consultants in connection with fuel production, distribution and utilisation. Among other activities it has been commissioned by the British Government, in conjunction with the governments of the colonies concerned, to carry out a full investigation into the coal resources of Nigeria, British North Borneo and Sarawak.

Your company has always been one of the foremost in the field of research. We have retained a substantial part of this side of our organisation. In the course of our research we discovered an entirely new method of producing carbon which, compared with methods now in use, possesses great advantages.

The development of this process has made rapid progress. We have been able to purchase a factory at Hayes, Middlesex, and we have promoted a new subsidiary company—Powell Duffryn Carbon Products,, Ltd., with a share capital of £500,000.

The research laboratories at Battersea are being widened in scope and adapted for use as a research organisation capable of conducting original research in a wider field. The name of the research organisation has accordingly been changed to Powell Duffryn Research Laboratories, Limited. (Abridged report.)

Fertilisers from Palestine

(from Our Jerusalem Correspondent)

TWO of the most important soil nutrients required for intensive agriculture—potassium sulphate and superphosphate—are soon to be produced in Palestine on a large scale. A £550,000 plant is now being constructed for Fertilisers & Chemicals, Ltd., a subsidiary company of Palestine Potash, in Haifa Bay, where industrialisation is proceeding rapidly. The capital for the new enterprise has been provided jointly by Palestine Potash, the Palestine Economic Corporation of New York, the African-Palestine Development Corporation and the Palestine Jewish Colonial Association.

The new works, which are to be one of the largest in the land, are being erected on a 75-acre site between the Consolidated Refineries and the Nesher Cement Factory, in the so-called "noxious zone" of Haifa Bay, which is set aside for the location of factories where malodorous processes may be involved. The plant will supply Palestine and the Middle East countries with all the chemical fertilisers they need, and will still have a margin for exports. Raw materials are at present won from the practically limitless resources of the Dead Sea, and are shipped to Europe, mainly to Belgium, for processing. The price of the finished article to Palestine's agriculture is therefore swelled by the heavy freight bill for transport of these important bulk commodities from overseas.

Wide Programme

The first aims of the new company are the production of sulphuric acid, potassium sulphate and superphosphates. Expansion plans include large-scale production of dicalcium phosphate for use as fertiliser and cattle food, hydrochloric acid and other basic chemicals and mixed fertilisers. The method of production worked out by the engineers of Palestine Potash has been successfully tested at a pilot plant at the northern end of the Dead Sea. The factory's blue print includes the provision of a railway siding for convenient transport within the country and to neighbouring States, all of which at present import their chemical and fertiliser requirements from Europe.

Already under construction, the works are expected to begin production before the middle of next year, when about 120 persons will be employed. The greater part of the machinery which was ordered in Britain and America in 1945 and 1946 has already been delivered.

Mr. M. A. Novomeysky, the managing director of Palestine Potash, is the chairman of the new company.

COMPANY REPORT

THE DISTILLERS COMPANY, LTD.

THE 70th annual general meeting of the Distillers Company, Ltd., was held in the North British Station Hotel, Edinburgh, on Wednesday, October 15, 1947, when, in the absence of the chairman, the deputy chairman, Mr. H. J. Ross, presided.

The deputy chairman said: The chairman has asked me to express to you his apology for not being present here to-day. Lord Forteviot has been ill for some months, and while his condition is improving, he is not sufficiently recovered to preside at this meeting. I am sure I shall be interpreting your wishes in proposing that we send, from this meeting, a message of sympathy and encouragement, and, at the same time, convey to him our best wishes for a speedy recovery to normal health. In these circumstances it falls upon me as deputy chairman to submit to you the chairman's address.

It is with deep regret that the board records the loss of a colleague, Mr. Alfred Horsfall, who died on October 20, 1946. Sir Vyvyan Board retired from the board as from January 1, 1947, with the view to continuing his work in the government service. The appointment by the board of Mr Alfred Adams as a member of the management committee took place on September 19, 1946. On September 19, 1946, Major C. J. P. Ball, Mr. T. F. A. Board, Mr R. S. Cumming and Mr. C. F. Merriam were appointed directors, and you will be asked to confirm their election.

Trading Results

Turning now to the statement of accounts you will find that the consolidated statement of profit covers a period from varying balancing dates of the parent and subsidiary companies to March 31, 1947. To comply with the new company legislation the board decided to fix March 31 as the balancing date for all the companies, and as a consequence the figures in the accounts are not comparable with those for the year to May 15, 1946. The manufacturing and trading profits, after making provision for Excess Profits Tax, Profits Tax and overseas taxations works out at £7,638,059, but while the profits of the parent company are included for a period of 10½ months, certain subsidiaries contributed for a full year, and a few for fifteen or more months. From an investigation of the accounts it is estimated that for a period of 12 months the profits approximated to £7,100,000, comparing with the corresponding figure of £6,914,330 for the year to May 15, 1946.

To the profit figure of £7,638,059 is added (1) revenue from investments and other miscellaneous receipts £907,333 and (2) provision for taxation made in previous years proved to be not required and now released £395,000, making the total revenue £8,940,392. After making full allowance for income tax on these profits, all necessary provisions and adding to superannuation and sundry reserves in the books of subsidiary companies, there remains £3,428,719 as the sum available to the Distillers Company, Limited. This compares with £2,574,760 for the year to May 15, 1946. In addition, however, it should be noted that the amount applicable to the Distillers Company, Limited, but retained by the subsidiary companies is £190,728 as compared with £103,920.

The board decided to appropriate and to apply to general reserve the sum of £1,100,000 (making it £6,000,000), leaving available with the amount brought forward, and after deducting directors' fees, compensation to directors for loss of office and the interim dividends, the sum of £1,181,364.

It is proposed to pay a final dividend on the ordinary stock of 2½ per cent less income tax (making 22½ per cent less income tax for the 10½ months period) and a special dividend on the ordinary stock of 2½ per cent less income tax, thus leaving to be carried forward the sum of £768,153 as against £591,654 brought in.

Important Acquisitions

During the period under review the company purchased from the Custodian of Enemy Property the 95,000 shares in British Industrial Solvents Limited, formerly held by German interests, making that company thereafter a wholly-owned subsidiary.

The company also purchased the issued share capital of Gilmour Thomson and Co., Ltd., blender, etc., Glasgow, and is carrying on the business.

In November of last year the company acquired the unissued capital of National Chemical Products, Ltd., Johannesburg, South Africa, amounting to 64,850 ordinary shares of £1 each. The terms of the arrangement provide for the acquisition of further shares to enable the South African company to undertake certain new developments now under consideration. National Chemical Products, Ltd., are distillers of industrial alcohol, and have a well established business in solvents and carbon dioxide.

A further investment made by your company, jointly with British Xylonite, Limited, in the proportions of 60 and 40 per cent respectively, was the purchase of the unissued share capital of Lansil, Limited, consisting of 203,367 ordinary shares of £1 each and 514,000 deferred shares of 1s. each.

Investments in British government securities have risen by a little over £1,200,000

to £17,353,626. The holdings are reasonably "short dated" and a revaluation at March 31, 1947, disclosed a market valuation of £17,712,734. As will be explained later, round about £7,500,000 of these holdings has been earmarked for developments in the chemicals and plastics sections of the company, while over £4,000,000 may go to the group pension scheme now under examination.

The consolidated statement of assets and liabilities discloses that while current assets amount to £54,247,421, current liabilities and provisions total £9,018,961, a surplus in this respect of over £45,000,000. This is proof of the great financial strength of the organisation, and it must be remembered that the fixed assets are included at low valuations.

The surplus applicable to the members of the Distillers Company, Limited, exclusive of the reserve for taxation on earned profits but not yet due, has increased to £20,669,907. The issued share capital is £17,225,847 including £2,200,000 of preference stock. As announced at the previous meeting, the board had given careful consideration to this aspect, but it was not possible to obtain permission to re-organise the capital structure.

The board has decided, however, that the time had arrived to place before the members their proposal to make the ordinary stock transferable in units of 4s. each instead of £1 units as at present. You have been asked to attend an extraordinary general meeting to be held immediately after this meeting, when full consideration may be given to the board's proposal.

Distilling

The Ministry of Food continues to exercise control of the production of potable whisky. As indicated to the meeting last year, the quotas out of the 1945 allocations of cereals were completed by the malt distilleries in June and the grain distilleries in September, 1946. In February and April 1947 the industry was granted allocations each of 50,000 tons, while in August further licences amounting to 75,000 tons were issued. This is equivalent in all to about 55 per cent of the pre-war production. These welcome releases were not made by the government without conditions. The Ministry would only grant licences to manufacture new whisky on the undertaking by the industry to increase exports of matured whisky to "hard currency" markets.

Yeast

The company's three yeast factories have been fully employed during the period. The production of the main product, bakers' yeast, continues to meet an increasing demand at home and abroad. The sales of yeast products—covering vitamin B_h1, invertase yeast and concentrate, ergosterol, medicinal, dried autolysed and food yeast—also show satisfactory progress.

Industrial Group

During the period under review the company expanded its industrial activities and put in hand the important extensions to which reference was made at the previous meeting. These extensions broadly cover a large increase in the manufacture of solvents, plasticisers, acetic acid and anhydride at the Hull works of the subsidiary company, British Industrial Solvents, Limited, and involves an outlay of about £2,000,000. In addition, a reorganisation of our plastics group has been carried out with the view of centralising and increasing our manufacturing operations at Barry, South Wales. New plants for our subsidiary companies, British Resin Products, Ltd., and British Geon, Ltd., are in course of erection to produce a range of synthetic resins, adhesives, moulding powders and compounds. The cost of these extensions will also approach £2,000,000.

The company has recently reached agreement with the Government for the purchase of the penicillin factory at Speke, Liverpool, which you will recall was erected and operated by the company as agents for the Ministry of Supply. It is proposed to operate this new development through a subsidiary company to be formed with a capital of about £1,000,000.

An important development which falls to be reported is the provisional agreement between your company and the Anglo-Iranian Oil Company, Limited, to erect a large plant for the production of chemicals from petroleum. Broad details of this scheme have already appeared in the Press, and stockholders will recall that last year reference was made to the need to provide alternative raw materials to serve as a basis for a number of our chemical products, and at the same time permit of the broadening of this range of materials by new ones, which should find a ready market within the United Kingdom and for export. The capital required for this project will be of the order of £5,000,000 which will be subscribed equally by the two companies. Subject to the approval of the authorities it is proposed to establish this joint venture at Grangemouth, in close proximity to the oil refineries of the Anglo-Iranian Oil Company. It will be appreciated that under present conditions a considerable period must elapse before this scheme can be completed, but, in view of the company's existing commitments in the chemical and plastic fields, your directors are satisfied that on a long term view this development is sound and necessary. It should greatly strengthen the country's position in these particular markets and effect a substantial saving in dollar currency.

The report was adopted.

Safe Heating

Device for Inflammable Liquids

A USEFUL simplification of the problem of heating inflammable liquids is afforded by a new heating mantle which can be used to replace oil baths and open heaters and provides accurately controlled electric heat. These "Isomantles" consist essentially of an insulating container lined with glass cloth into which is woven a nichrome heating element, so spaced that about two-thirds of the wattage is dispersed in the lower half of the heater. A thick layer of glass wool is used for insulation between the heating element and the outer glass cloth jacket.

Temperature control is provided by a 3-pin plug unit which gives continuously-variable control from zero to maximum.

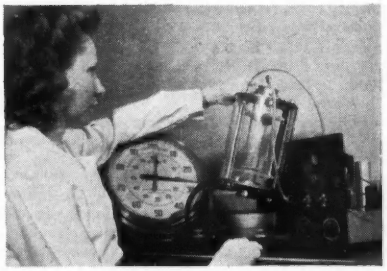
For holding the heating mantle, there is an aluminium support which is fitted with an extension rod. Thus the mantle may be placed on a bench or clamped to a retort stand. Electric heating mantles are particularly useful for fractionations of inflammable liquids where exact control of the heat input is necessary, and for distillation of high boiling point materials as temperatures up to 300/350°C. can be obtained and controlled. The large surface heating area eliminates "bumping." The makers of these new aids in laboratory work are J. W. Towers & Co., Ltd., Victoria House, Widnes.

The mantle and heat control

Viscosity Measurement

New Electronic Timer Perfected

VISCOSITY measurement is of prime importance to many industries—notably paints and lacquers, oil, asphalt and related chemical industries—and a new electronic timer has been developed at the U.S. National Bureau of Standards to make the job easier. The new timer, adapted for use with a falling-ball viscometer in the study of the rapidly changing viscosity of an opaque fluid, was designed by P. J. Franklin and consists of pulse sharpening and trigger circuits. The passage of the ball through two coils around the viscometer is used to trigger a radio frequency oscillator, starting and stopping a timing device.



The new electronic timer, seen on the right, is coupled to the two coils encircling the viscometer tube within the constant-temperature jacket. The inductance of the coils is charged as a steel ball falls through the test liquid.

The electronic timer was designed for repeated measurement of the viscosity of an opaque liquid held within a limited temperature range. At present most methods of determining viscosity are based upon a rate of flow through a capillary tube or through a small orifice or depend upon the rate of rotation of a cylinder or paddle wheel within a cup containing the liquid. None of these procedures seemed well adapted to temperature control or practical for measuring viscosity of an opaque liquid, and it was decided that the falling-ball apparatus was the most suitable for this application.

While various electrical methods employing the conductive or magnetic characteristics of the falling ball had previously been used to measure its time of travel, none of these methods was considered completely satisfactory, due to lack of sensitivity, poor reproducibility of results, or the complicated nature of the circuit required. The induction method used in the timer seems to be the answer to the problem, permitting a measurement of time of fall reproducible within 0.01 sec. for a fall time of 2.5 sec.

PERSONAL

DR. F. A. TODD has joined Messrs. Genatosan, Ltd., as production manager.

MR. J. FRISKEN has received the appointment of works manager at the Immingham (Lincs) factory of Messrs. Fisons, Ltd.

MR. G. C. R. ELEY has been appointed deputy chairman of British Drug Houses, Limited.

DR. E. D. KAMM has been appointed to the board of I.C.I. (Plastics), Ltd. He has been in the company's service for almost 20 years.

MR. WILLIAM ECCLESTON has retired from the post of chief chemist to the Calder & Mersey Extract Co., Ltd., after 45 years' service. His successor is MR. F. B. HOBSON.

DR. H. V. WALTERS, chief physicist of Dufay-Chromex, Ltd., who has been appointed British Council (Science) Officer for China, left this country on October 16. He will work with Dr. R. A. Silo, the Director of the British Council's science office in China. Dr. Walters, who is 30, obtained a B.Sc. in 1938 at the Imperial College. He joined Dufay-Chromex in 1941.

ARNOLD H. SMITH, acting managing director of Monsanto (Australia) Pty., Ltd., has been elected vice-president of the board of directors of Monsanto (Canada), Ltd., and will assume his duties on January 1, 1948. The appointment is consequent upon the resignation of MR. IRVING C. SMITH, promoted to assistant general manager of Monsanto's Western Division, with headquarters at Seattle, Washington.

MR. FREDERICK BELL, distributing engineer to the Liverpool Gas Company, is the new president of the Manchester District Association of Gas Engineers; he was formally installed on Saturday last. Mr. Bell returned this week from the U.S.A. where, in addition to studying problems of distribution, he has been telling America about the only automatic gas distributing system in this country, which he controls for the Liverpool Gas Company.

British " Pet-Chem " Directors

The first directors of British Petroleum Chemicals, Ltd.—the new company recently formed by the Anglo-Iranian Oil Co. and the Distillers Company for the production of chemicals from petroleum—have been announced as follows:

MR. ROBERT CRICHTON (Scottish Oils, Ltd.); MR. JAMES A. JAMESON, MR. F. G. C. MORRIS, and MR. N. A. GASS (Anglo-Iranian directors); MR. T. F. A. BOARD, MR. L. A. ELGOOD, and MR. C. G. G. HAYMAN (Distillers directors); and MR ERIC STEIN (British Industrial Solvents).

MR. JOHN LEWIS, who at 34 is an M.P. and managing director of Rubber Improvement, Ltd., as well as president of the National Reclaim and Allied Rubber Trades Association, is engaged to be married to Miss Joy Fletcher, of London.

MR. GEORGE STEEDMAN, chemical manufacturer, of 19 Thorn Road, Beardens, Glasgow, has died.

U.S. Atom Appointments

Appointments of three top-ranking scientists as key personnel at Brookhaven National Laboratory in Upton, Long Island, N.Y., north-eastern centre for research in the fundamentals and beneficial applications of atomic energy, were announced last week in New York.

DR. LELAND J. HAWORTH has been named as assistant director in charge of research projects. Prior to his present appointment, Dr. Haworth was a professor of physics at the University of Illinois. From 1941 to 1946, on leave from the University of Illinois, he was a specialist in radar development and nuclear physics at the Radiation Laboratory of the Massachusetts Institute of Technology, Boston. In research, he has specialised in the energy distribution of secondary electrons, extremely low temperatures, electronics and nuclear physics.

DR. LESLIE FREDERICK NIMS, who has been appointed chairman of the Department of Biology, comes to Brookhaven from Yale University, New Haven, Connecticut, where he was associate professor of physiology. He investigated the thermodynamic properties of salt solutions, the ionisation constants of weak acids, and the hydrogen ion concentration in living systems.

The third appointment announced is that of DR. THOMAS HOPE JOHNSON as chairman of the Department of Physics. During the war, Dr. Johnson was with the Ballistic Research Laboratory of the Ordnance Department at Aberdeen, Maryland. He was also an official investigator and a section member of the National Defence Research Committee from 1940 to 1942, after which he became chief physicist and associate director of the Ballistics Laboratory. After the war, he was sent to Germany on a special mission for the Ordnance Department of the U.S. Army. At present, he holds the post of chairman of the Panel on the Upper Atmosphere for the Joint Research and Development Board. He is a fellow of the American Physical Society and a member of the American Geophysical Union.

Obituary

MR. F. J. GRIFFIN, formerly a director of Avondale Tinplate Company, has died at Monmouth, aged 79.

PROGRESS IN FACTORY SAFEGUARDS

BRITISH AND AMERICAN PRACTICE CONTRASTED

MANY fundamental aspects of the problem of raising the margin of safety in factory operations were reviewed by authorities at the industrial sessions of the recent Safety Congress in Brighton which marked the silver jubilee of these congresses arranged by the Royal Society for the Prevention of Accidents.

Of more than usual interest were the studies of safety standards in American factories provided by Mr. L. N. Daguid, H.M. Superintending Inspector of Factories, and Mr. R. E. Tugman, Divisional Safety Officer of Imperial Chemical Industries, Ltd. (Alkali Division), who had lately toured U.S. factories to study what standard of safety had been attained and what useful principles they had to teach. The conclusion that can be reached as a result of those studies is that safety standards in British factories are, as a whole, higher than the general standard in America.

Contrasts

Mr. Duguid said that only a few states—notably New York and California—had safety legislation comparable to that in Great Britain. Other states either had very little legislation or else had laws which were not well enforced.

In New York State, which was one of the best, the state inspectors had power to order a machine to be stopped immediately if they considered it unsafe to use. In New Jersey, on the other hand, the inspectors had no power to enter a factory except on the invitation of the occupier.

America had nothing to teach us about the fencing of machinery. Such obvious hazards as shafting and gears were guarded, but "point of operation" guarding was badly neglected. Lifts and hoists in factories were poorly guarded, although America prided herself on her lifts.

Dust and fume removal in American factories was good, but general factory ventilation was not. Air-conditioning systems, for which America was well known, were found in trains, cinemas, shops, hotels and other places where there were customers to be satisfied, but there were very few to be seen in factories.

Better than in U.K.

Mr. Tugman said that he went to America to learn what he could about safety methods and therefore visited only the best factories. What he had seen was not necessarily typical of American industry as a whole, but he was satisfied that the best results achieved in America were better than the best results achieved in Great Britain. Making all allowances for different methods of calculation, he had come to the conclusion that in the best American works the accident rate was only one-quarter of the lowest figures recorded in this country.

One reason for this was that, in the best firms, the drive from the top was more apparent than in Great Britain, and there seemed to be a greater emphasis on managerial responsibility for accident prevention. More staff was employed to encourage, co-ordinate and advise on safety at all levels of management.

Personal contact between foremen and men seemed to be one of the most important planks in the safety platform. The foremen in American industry did not occupy quite the same place as in this country, and the number of men for whom a foreman was responsible seemed very small compared with the large number he often supervised over here.

On the subject of protective clothing we had not much to learn from the U.S.A.; guarding of machinery was not practised to nearly the same extent as in this country.

£1 Million for Uranium Ore

Britain is understood to have purchased from the Belgian Congo last year 2600 tons of uranium ore at a cost of over £1 million. Purchases by the United States—according to information secured by the *Yorkshire Post*—were 3653 tons, valued at about £332,000. Before atomic use of uranium began, practically the whole of the Congo ore output went to Belgium for the production of radium. Output is stated to have risen from 1500 tons in 1939 to 9966 tons in 1945, when the first atomic bomb was made. The price of the ore is some 30 times as high as two years ago.

Coal and Chemical Prices

Chemicals and oils were affected more intimately than almost any other production group by the rise in coal prices, of which the pithead cost was increased on September 1 by 4s. per ton. This is itself the largest individual increase recorded in the review of wholesale prices in September appearing in the current *Board of Trade Journal*, which shows an overall increase in wholesale prices of 0.6 per cent between August and September. The rise in coal prices is outstanding—from 244.2 per cent in August (1930=100 per cent) to 266.3 per cent in September.

Home News Items

Dinner Cancelled.—The dinner which the National Lubricating Oil and Grease Federation was intending to hold at Grosvenor House, London, W, on November 5, has been cancelled.

Open-Cast Oil-Shale Mining.—Production of oil shale by open-cast methods, which began to take shape in July of last year at Fife, now amounts to about 15,000 tons a month. Output per worker is said to be 30 tons daily as compared with 5-6 tons from deep mining.

Dunlop's Production Record.—During a recent visit to Fort Dunlop, Mr. Herbert Morrison congratulated the company's employees on their achievements in beating all previous records for the production of mixed rubber, and giant and tractor tyres. "A very fine record indeed," he said.

APV Acquire Paramount Alloys.—To meet their increasing requirements in stainless steel castings the Aluminium Plant and Vessel Co., Ltd., Wandsworth Park, London, S.W.18, have purchased the business of Paramount Alloys Ltd., Slough, and will operate it as an independent subsidiary.

Fire at Chemical Stores.—Fire extensively damaged the chemical stores of Messrs. Potter and Clarke at Gardiner's Lane, Dublin, last week. Inflammable goods in the store made the work of four sections of the Dublin fire brigade difficult, but the outbreak was eventually brought under control. A number of families in houses nearby were temporarily evacuated because of the possibility of explosions.

8000 Fewer at Work.—A drop of approximately 8000 in the working population, despite a reduction of 9279 in the number unemployed, is shown in a summary, as at September 15, prepared by the Ministry of Labour. Of the total working population of 20,146,000, the number of men (14,426,000) increased 6000 and of women (5,720,0000) decreased by 14,000. Industry employed 12,844,000 men, 52,000 more than in July.

Coal Figures Still Rising.—The rise in coal production lately recorded has been continued. This is recorded in the Ministry of Fuel's summary for the week ended October 18, when the total was 4,049,000 tons, of which 255,200 tons was from open-cast workings, comparing with a total of 3,893,700 tons in the week ended October 12 last year. A total of the first 42 weeks of this year shows production was 155,746,100 tons compared with 150,995,300 tons in the same period last year.

Atomic Energy Exhibition.—The mobile atomic energy exhibition, to which reference was made in a previous issue, is to open at Liverpool on November 6. It will later be transferred to Chester where it can be seen on November 10.

Anti-Friction Metal Recognition.—"Eel" brand nickel-hardened anti-friction metal, which is produced by Messrs. Murex, Ltd., has been recognised by Lloyd's Register of Shipping as complying with the high standards accepted by that body for use in ships' machinery.

Fire Extinguisher Standard.—A British Standard for portable fire extinguishers of the gas/water-pressure type (riveted construction) (B.S. No. 1382), has just been issued and is obtainable from the British Standards Institution, 28 Victoria Street, S.W.1, price 2s., post free.

Non-Ferrous Metals Directorate (Disposals) Address.—The Ministry of Supply announces that from October 20, 1947, the address of the Non-Ferrous Directorate will be 2 Hyde Park Street, London, W.2, instead of 31-43 Norfolk Square, London, W.2. (Ambassador 1290). The telegraphic address remains Metrol, Padd, London.

Farwig Outing.—Employees of J. F. Farwig & Co., Ltd., manufacturers of tins and capsuling machines, recently went on an outing by coach to Brighton. After lunching at the Old Steine Restaurant, the party heard an address of welcome by the company's chairman, Mr. E. D. Warren.

Bibby & Sons Acquisition.—An area extending to six acres at King George V Docks, Glasgow, is to be sold by the Clyde Navigation Trust to Messrs. J. Bibby and Sons, Ltd., cattle feeding stuffs and soap manufacturers. The company had considered acquiring premises at Renfrew, but owing to height restrictions imposed by the Ministry of Civil Aviation in the vicinity of Renfrew aerodrome, had to look elsewhere.

Research Laboratory Gutted by Fire.—A large research laboratory in the Department of Organic Chemistry at Liverpool University was gutted by fire on October 10. The laboratory is one of several and the work of the department will not be seriously affected. Owing to the large quantity of water used in extinguishing the fire, some of which seeped through to another floor, a second laboratory below had to be temporarily evacuated. Damage runs into thousands of pounds, and students have lost valuable books and records of experiments. The cause of the fire is unknown.

Overseas News Items

Swedish Sulphite Plant for India.—A Swedish sulphite manufacturing firm has sold its plant to an Indian concern for erection at Calcutta.

Australia Bans U.S. Periodicals.—In order to save dollars, Australia has temporarily suspended imports of all American periodicals either in bulk or by single subscription.

German Potash for Canada.—During the first six months of the current year Canada imported potash from the Soviet Russian zone of Germany to the value of 263,000 dollars.

Marine Mishap.—Aniline fumes released when a typhoon smashed containers in the British vessel *Eurypylus* killed a seaman. Six others who inhaled fumes are under treatment in Hong Kong.

Fertilisers From Atomic Plant.—According to Mr. H. Wallace, former U.S. Vice-President, the atomic energy plant at Oakridge, Tennessee, will soon produce large quantities of fertiliser as a by-product.

Shell's New Glycerine Plant.—The Shell Corporation of America plans to produce synthetic glycerine at a new plant in Houston, Texas, where production is to start early next year.

U.S. Lacquer and Paint for Sweden.—In spite of the handicap imposed by the dollar shortage, the United States is reported to have replaced Germany as the leading supplier of lacquer and paint in the Swedish market.

Dutch Chemical Expansion.—The municipal authorities of Rotterdam are reported to have under consideration an application for a site from Bataafsche Petroleum Mij., a member of the Royal-Dutch-Shell group, for the erection of two chemical factories.

"Artificial Quartz" in U.S.A.—The Bell Telephone Company is reported to have developed a substitute for natural quartz. It is designated "EDT," which is abbreviation for ethylene diamine tartrate. This product is to be manufactured in a special plant at Pennsylvania.

New Soviet Companies in Germany.—The Moscow State Company for precision machinery, "Totschmasch," has established a branch at Erfurt with a share capital of 100 million roubles. The Moscow State Company for the rubber industry has also established a branch there with 20 million roubles as share capital. Other branches are being set up at Erfurt by the fertiliser company "Kali," the companies "Kainit" and "Silvinit" with a share capital of 100 million roubles each.

New York Chemical Exhibition.—The 21st Exposition of Chemical Industries will be held in New York at the Grand Central Palace during the week December 1 to 6.

Copper for Germany?—A Duisburg copper-smelting company is reported to be negotiating with the Rio Tinto Company for supplies of raw material.

Chile Rations Coal.—As a result of the recent wave of strikes in the Chilean coal-mining industry, stocks have become so depleted that President Videla has ordered a nation-wide rationing of coal.

Blast Furnace Record.—The six blast furnaces of the U.S. zone of Germany are reported to have achieved a total output of 28,500 tons in September, the highest monthly figure of the occupation period.

Holland/French Zone of Germany Trade Pact.—Chemical products figure in a list of goods to be sent from the French zone of Germany to Holland under the terms of a recently concluded agreement.

Chlorine River Transport in U.S.A.—The chemical division of the Pittsburgh Plate Glass Co. is reported to have introduced the transport of liquid chlorine by tank barges on the Mississippi and Ohio and on their tributaries.

U.S. Fertiliser Production.—In the 1947-48 season, U.S. fertiliser industry intends to manufacture only 17 million tons of products instead of the 20 million tons, of which it is capable. This under-capacity programme is said to be due to shortage of transport.

Canada to Exploit Iron-Ore?—Increasing attention is being given in Canada to the exploitation of the Quebec-Labrador iron-ore deposits which are said to contain proved ore reserves totalling about 100 million tons. It is thought that another 200,000,000 tons exist.

Formosa Camphor Industry.—The National Resources Commission of the Chinese Government is attempting to rehabilitate the Formosan camphor industry which formerly supplied nearly three-quarters of the world's needs. The industry is said to be at a complete standstill at the moment.

Argentina/Italy Trade Agreement.—Under the terms of a commercial agreement signed in Buenos Aires last week, Argentina will supply Italy with surplus commodities including 10,000 tons of linseed, 25,000 tons of edible sunflower oil, and 25,000 tons of hogs lard. In return, Italy will send manufactured goods including rayon and industrial machinery.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

INERTOL CO., LTD., Hull, chemical manufacturers. (M., 25/10/47.) Sept. 15, £4500 mortgage, to R. W. Baird, Harrogate; charged on factory at Courtney Street, Hull. *Nil. April 18, 1946.

ANGLO-AMERICAN NITROGEN CO., LTD., Leicester. (M., 25/10/47.) Sept. 19, £2000 mortgage, to J. H. Main, Leicester, and others; charged on land adjoining Green Lane Road and Rosebery Street, Leicester, with the offices, hardening shops and other buildings, erected thereon. *Nil. March 22, 1944.

Company News

The nominal capital of **Lankro Chemicals, Ltd.,** Bertcliffe Works, Salters Lane, Eccles, Lancs., has been increased beyond the registered capital of £5,000, by £20,000, in £1 ordinary shares.

The nominal capital of **Barnet Lime Company, Ltd.,** Barnet By-Pass, South Mimms, Herts., has been increased beyond the registered capital of £2,000, by £5,000, in £1 6 per cent cumulative redeemable preference shares.

The Distillers Company, Ltd. announces that it has declared a dividend on the preference stock at the rate of 3 per cent for six months ended September 30, 1947, to be paid on November 15, to stockholders on the register at October 15.

New Companies Registered

Czechoslovak Chemical Works (London), Ltd. (443,283).—Private company. Capital £10,000 in £1 shares. Subscribers: George Lewi, D.Sc., and B. Dostal. Solicitors: Pritchard Englefield & Co., E.C.4.

S. A. Hampton, Ltd. (442,511).—Private company. Capital £10,000 in £1 shares. Manufacturers of and dealers in chemicals, gases, drugs, medicines, disinfectants, fertilisers, oils, colours, pigments, varnishes, etc. Directors: S. A. Hampton and Mrs. Dorothy C. Hampton. Registered office: 36 High Street, Brentwood.

B. G. Plastics, Ltd. (442,821).—Private company. Capital £10,000 in £1 shares. Directors: G. H. Dowty, A. S. Brewer, J. Gibbons and G. P. Baldwin. Secretary: L. Barber. Registered office: Royal House, Cheltenham.

Tresco Plastics, Ltd. (442,685).—Private company. Capital £3000 in 2250 preference and 750 ordinary shares of £1 each. Manufacturers of and dealers in plastics, manufacturers and manipulators of cellulose acetate and synthetic resins, celluloids, varnish, enamel, pigments, oils, colours, etc. Directors: K. H. Griffiths, and B. H. Brawn. Registered office: 79 Croyland Road, Wellingborough.

Aliput Manufacturing Company, Ltd. (442,700).—Private company. Capital £100 in 100 shares of £1 each. Building trade and industrial research workers for discovering protective treatment for structures, tanks and plant, or for improving industrial processes with special attention to adhesives. Subscribers: M. Striker and H. Barron. Morris Striker is the first director. Registered office: 8 Princes Street, W.1.

Theratronics, Ltd. (442,984). — Private company. Capital £9500 in 9500 shares of £1 each. Designers, producers, manufacturers and distributors of and dealers in scientific apparatus and equipment of all kinds, and in particular electro-medical apparatus and equipment, etc. Directors: Mrs. Florence M. MacPhail, Mrs. Flora Solomon, and W. L. Nicholson. Registered office: 14 Dartmouth Street, S.W.1.

Industrial Metals & Chemicals Company, Ltd. (443,297).—Private company. Capital £1000 in 1000 shares of £1 each. Manufacturers, importers and exporters of and dealers in all kinds of metals, minerals, ores and alloys, chemicals, acetylene and all other articles required by metallurgists, welders and gas and electricity undertakings, etc. Subscribers: R. A. Boswell, 25 York House, Turks Row, Chelsea, S.W.3, and P. S. Hawkings. R. A. Boswell is the first director.

Chemical and Allied Stocks and Shares

CAUTION has remained the keynote of stock markets, partly owing to news of the further gold sale to the United States and the general belief that the outlook for industrial shares cannot be assessed prior to the emergency Budget. There is continued talk in the City of a big increase in taxation of company profits and of widespread additions and increases in Purchase Tax. British Funds failed to hold all earlier gains, but there was somewhat better demand for leading industrial shares on the view that recent declines on Budget fears

appeared to have been carried too far in some cases.

Imperial Chemicals have been firmer at 45s. 9d., with Monsanto Chemicals higher at 57s. 6d., and Greeff-Chemicals Holdings 5s. ordinary at 15s. remained under the influence of the recent increase in the interim dividend. B. Laporte were 81s. 3d., W. J. Bush 85s., and Glaxo Laboratories strengthened to £18¼. Fisons changed hands up to 64s. 3d., and in other directions, Lawes Chemical 10s. ordinary remained at 13s. The units of the Distillers Co., now in their "split" 4s. form, have been active up to 28s. partly owing to the statements at the recent annual meeting indicating the big expansion in the drug-manufacturing activities of the group. Borax Consolidated deferred were steady at 53s. 1½d., with British Glues & Chemicals 4s. ordinary firm at 18s. 9d. British Oxygen improved to 90s., but at 71s. Turner & Newall failed to hold all of an earlier rally. Lever & Unilever moved up to 49s. 6d. United Molasses have been active around 47s. 6d. awaiting the interim dividend, and in other directions, Triplex Glass 10s. ordinary strengthened to 29s. 3d.

The further news of expansion in steel output kept firmness in iron and steel shares which were generally a few pence higher where changed, United Steel being 25s. 1½d. on consideration of the full results, Guest Keen 47s., Babcock & Wilcox 68s. 9d., while in response to the higher interim dividend, Hopkinsons rose 5s. to £5. Dorman Long strengthened to 25s. 3d., Colvilles to 26s. 1½d., and colliery shares remained firmly held in view of estimates of their ultimate break-up values, which in most cases appear to be well above current market prices. Elsewhere, however, Tube Investments eased to £5 15/16, British Aluminium have strengthened to 44s. 9d., and General Refractories displayed steadiness at 21s.

Textiles were inclined to firm up, it being pointed out that in many cases there would be scope for good increases in dividends in future, even if Profits Tax were doubled, assuming that it is possible to achieve export targets. Bradford Dyers improved to 22s. 4½d., Fine Spinners to 29s. 10½d., while Calico Printers were 21s., and Bleachers 9s. 7½d. Courtaulds transferred around 43s. 7½d. and awaiting the full financial results, British Celanese were 23s. 10½d. Wall Paper Manufacturers deferred fluctuated moderately around 40s. 9d. awaiting the dividend announcement. British Plaster Board were 23s. 6d., and Associated Cement 59s. 9d.

Beechams deferred were little changed at 21s. 9d. following the news that, owing to changed market conditions, the proposed issue of additional deferred to shareholders is to be replaced by a public offer of 1,500,000 new 4½ per cent redeemable cumulative preference £1 shares, shareholders having preferential allotment. Boots Drug were 55s., Timothy Whites 42s. 6d., and Sangers 30s. 6d. Oil shares moved higher on balance, sentiment being helped by the news of further increases in U.S. crude oil prices and by continued reports of a big new issue of capital planned by the Shell-Royal Dutch group. A new private company for the manufacture of chemicals from petroleum has been registered and directors of the Anglo-Iranian and Distillers companies are represented on the board.

British Chemical Prices

Market Reports

THERE have been no changes of importance on the industrial chemicals market during the past week, and the movement in all sections has been of fairly substantial dimensions. Prices generally remain very firm. Supply difficulties continue to restrict activity in the potash chemicals market, and there has been no easing of the position for bichromate of soda. A steady call for the lead oxide has been maintained and formaldehyde, acetone, acetic acid, and barium chloride are items which are in active request. There is little of fresh importance to report in the coal-tar products section. Prices are unaltered with a strong undertone and the demand continues much in excess of available supplies.

MANCHESTER.—The recent stiffening of prices in a number of directions has done nothing to reduce buying interest in both light and medium chemicals. From the point of view of new inquiries, as well as of actual business, a fair amount of activity has been reported on the Manchester market during the past week. Textile bleaching, dyeing and finishing chemicals have been in steady request, and there has been sustained pressure for deliveries of a wide range of products from other industrial users. In the market for fertiliser materials also some sections are fairly busy. In pitch, creosote oil and most other tar products the movement into consumption is maintained at a good level. In the metal market, buying licences for cast-iron scrap having been distributed fairly generously, there is considerable pressure on supplies. All saleable parcels of cast scrap are taken.

GLASGOW.—Fairly busy conditions have prevailed in the Scottish chemical market during the past week, and available supplies of most chemicals have been reasonably well absorbed. There has been no improvement in those chemicals known to be in short supply, such as sodium and potassium salts. In the export market there has been little change, a few orders again being booked. Sterling difficulties continue adversely to affect a number of possible orders.

Patents in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted may be obtained from the Patent Office, Southampton Buildings, London, W.C.2., at 1s. each.

Urea formaldehyde cashew nut shell liquid reaction products.—Harvel Corporation. Dec. 7, 1939. 20217/1947.

Metallo-sulpho-methyl-phenols. — Harvel Corporation. March 23, 1946. 20218-19/1947.

Polymerisation of unsaturated phenolic compounds.—Harvel Corporation. Feb. 13, 1940. 20220/1947.

Sulphonation products of cashew nut shell liquid and the like.—Harvel Corporation. Sept. 1, 1939. 20221-22/1947.

Preparation of ethers of anacardic materials.—Harvel Corporation. Jan. 30, 1945. 20223-24/1947.

Hydrogenation processes.—Harvel Corporation. March 21, 1945. 20555-56/1947.

Rubber-like compositions.—Harvel Corporation. Aug. 17, 1945. 20557/1947.

Phenol-acetal reaction products.—Harvel Corporation. June 29, 1943. 20560/1947.

Compositions comprising synthetic rubber and ancardic materials.—Harvel Corporation. July 27, 1944. 20561/1947.

Laminated products.—Harvel Corporation. Nov. 15, 1938. 20562/1947.

Cashew nut shell liquid furfurhaldehyde condensation products.—Harvel Corporation. July 17, 1940. 20563/1947.

Insecticides.—Harvel Corporation. May 26, 1939. 20566-67/47.

Polymerised chloroprene-cashew nut shell liquid composition. Harvel Corporation. May 26, 1939. 20568/1947.

Preparation of phenolic ethers and esters. —Harvel Corporation. Nov. 28, 1939. 20569/1947.

Phenol aldehyde ether condensation products.—Harvel Corporation. Oct. 10, 1942 20570-71/1947.

Phenolic condensation products.—Harvel Corporation. Oct. 10, 1942. 20572-73/1947.

Insecticides.—Harvel Corporation. Jan. 23, 1940. 20574-75/1947.

Insecticides.—Harvel Corporation. May 26, 1939. 20736-37/1947.

Purification of glycerol solutions.—J. K. O. H. Holmberg. Feb. 20, 1946. 1769/1947.

Alloy steel.—Inland Steel Co. Dec. 26, 1944. 7658/1946.

Re-inforcing bars.—Inland Steel Co. May 24, 1944. 20907/1947.

Finishing rolls and method of making same.—Inland Steel Co. May 24, 1944. 20908/1947.

Process for separating components of fluorination reaction mixtures.—Kinetic Chemicals, Inc. Feb. 14, 1945. 20604/1947.

Steel product and method of manufacture.—La Salle Steel Co. April 22, 1939. 20668/1947.

Synthesis of adrenal cortical hormone.—Merck & Co., Inc. July 14, 1945. 19042-43/1947.

Process of producing a dicarboxylic acid derivative of a sulphathiazole.—Monsanto Chemical Co. Sept. 10, 1942. 22342/1945.

Process of an aqueous dispersion for treating fibrous materials.—Monsanto Chemical Co. Aug. 24, 1944. 16902/1946.

Process of making ethylene oxide, and the improved catalyst suitable for use in said process.—Monsanto Chemical Co. Feb. 9, 1945. 23819/1946.

Methods of preserving rubber and the vulcanised rubber product resulting therefrom. —Monsanto Chemical Co. Jan. 14, 1943. 20780/1947.

Processes for the production of olefinic chlorhydrines.—Montecatini Soc& Generale Per l'Industria Mineraria e Chimica. Oct. 23, 1941. 20926/1947.

Colloidal solutions of inorganic oxides.—National Aluminate Corporation. April 15, 1940. 20400/1947.

Process of producing rayon.—North American Rayon Corporation. March 7, 1940. 20834/1947.

Manufacture of dyestuffs of the copper phthalocyanine type.—G. M. O'Neal. March 17, 1943. 20472/1947.

Recovery of organic materials.—Permutit Co., Ltd. May 17, 1944. 21057/1947.

Recovery of organic materials.—Permutit Co., Ltd. May 10, 1944. 21058/1947.

Recovery of organic materials.—Permutit Co., Ltd. May 10, 1944. 21059/1947.

Acid triphosphates as builders for alkyl sulphates and other soapless detergents.—Proctor & Gamble Co. Feb. 6, 1941. 21094/1947.

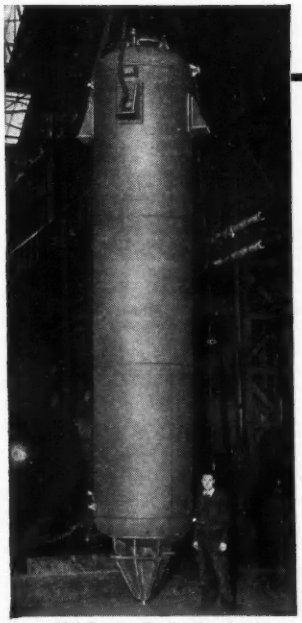
Method of manufacturing sulphurous anhydride.—J. C. Seailles. Jan. 1, 1944. 20481/1947.

Method for making phenol.—Socony-Vacuum Oil Co., Inc. May 24, 1941. 20152/1947.

Production of nitriles.—Socony-Vacuum Oil Co., Inc. June 6, 1944. 20154/1947.

Aminoalkyl derivatives of thiophenes.—Socony-Vacuum Oil Co., Inc. Dec. 21, 1945. 20435/1947.

Method of producing an acid-neutralising medium for peroral employment.—Solusol I/S. Feb. 23, 1946. 5037/1946.



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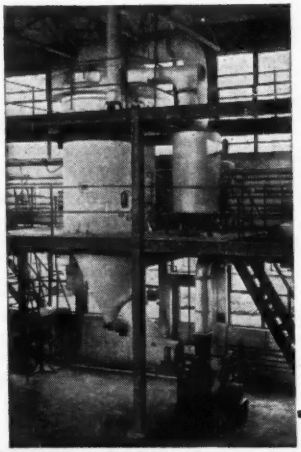

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